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JOBS FOR THE FUTURE

COMPETENCY EDUCATION RESEARCH SERIES

THE PAST AND THE PROMISE: TODAY'S COMPETENCY EDUCATION MOVEMENT

By Cecilia Le, Rebecca E. Wolfe, and Adria Steinberg
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INTRODUCTION

The emergence of the modern American high school ranks among the most remarkable accomplishments in U.S. history. Over just a few decades, from the late 1800s through the 1930s, secondary education evolved from a scattering of elite, private academies into one of our most vital public institutions. Previously, few adolescents attended secondary school; most worked after eighth grade to help support their families. The extraordinary enrollment surges of the immigration era required massive investments and ambitious planning.¹ Cities and towns went on unprecedented construction sprees, while educational leaders invented the organizational and administrative systems that made it possible to manage the vast number of students and teachers who showed up at the new buildings. Thus took shape many of the features of high school that define secondary education today: students grouped into age-based cohorts; days divided into a series of class periods; classes combined into year-long courses; progress determined by grades; course grades determined by attendance and academic performance—and graduation based on accumulation of credits, earned for each course with a passing grade.

It does nothing to diminish those accomplishments to note that some of the organizational decisions, such as age-based grouping, were criticized from the start. Now, more than a century later, as we grapple with the greatest challenge of our current era—preparing all students from all backgrounds for college and careers—many people are taking a hard look at our hundred-year-old assumptions about the best ways to organize K-12 education, particularly at the high school level.

Champions of change support a variety of reform strategies. But one in particular—competency education²—is attracting significant interest for challenging the traditional “factory model” structure of the American school system, in which young people spend a standard amount of “seat time” in class and typically move to the next grade level at the end of each school year with their age-based cohort. In order to earn credits and advance, students are required only to earn cumulative grades above “F”—indicating anything from mastery to large gaps in knowledge and skills.³ Hence students can graduate without ever filling in these gaps.

Competency education offers a fundamentally different approach than the early 20th-century industrial age model that prevails today. Although it is an evolving field with no universally shared definition⁴ of what makes a model

“competency based,” advocates generally cite the fact that students are expected to demonstrate mastery of increasingly challenging material from a comprehensive set of learning objectives, or “competencies,” aligned with state standards. These demonstrations of mastery do not occur at preset times, but when individual students are ready. Increasingly proponents call for infusing competency education with elements of personalization, in order to present a more student-centered alternative to the traditional model. They emphasize that students are all held to the same high expectations, but instruction is individualized to meet each person’s strengths and challenges. For others, the most important thing is that teachers focus special attention on making sure those who are struggling in any area receive support until they reach proficiency.

However expansive the definition, the concepts behind competency education are not new; their origins reach back to the progressive education ideals of the early 1900s, and the ideas gained popularity in the form of mastery learning during the 1970s and 1980s. But while competency-based approaches never fully took root in the past, an unlikely fusion of factors shaping public education is broadening their appeal today: the growth of standards-based reform, interest in personalizing schools, and the development of new technological tools.

In this paper, we explore several essential questions about today's competency education reforms. Our intent is to lay a foundation for assessing the potential of competency-based approaches, as they currently exist and as they could eventually evolve. We believe that a reorganization of schooling is long overdue and that the reforms explored in this paper may have the potential to help narrow achievement gaps and better prepare all young people for life after graduation.

This paper attempts to answer several key questions about the emerging field of competency education:

- What is driving the interest and investment in competency-based education models and policy today?
- Given that education reforms focused on learning outcomes are not new, what historical efforts are current competency-based practitioners building upon and what lessons can we draw from them?
- What can we infer from research and theory on effective student-centered learning about implications for personalized competency-based education programs?
- What opportunities and challenges does the current competency education movement face?

Although the paper focuses primarily on competency education, we do not consider it a complete solution. Rather, we view it as one important part of a broader vision of education reform that places students at the center of their learning. In 2010, Jobs for the Future launched the Students at the Center initiative, supported by the Nellie Mae Education Foundation, to help inform growing interest in student-centered approaches with the best available research from the cognitive and learning sciences.⁵ In a series of commissioned papers and a 2013 book published by Harvard Education Press, we present evidence and arguments concluding that students are more engaged, more motivated, and achieve better learning outcomes under four key conditions: education is personalized to their needs; they can advance upon mastery of clear learning targets; they have a range of learning opportunities in and out of school; and they have voice, choice, and agency in their learning experiences. The following investigation shines light on the opportunities and challenges involved in combining two of these tenets—competency education and personalization. Based on past research and early results, we are hopeful that many schools and systems embracing this combination of approaches will also pay attention to the other two aspects of student-centered learning and, consequently, see better results for all students.



As we grapple with the greatest challenge of our current era—preparing all students from all backgrounds for college and careers—many people are taking a hard look at our hundred-year-old assumptions about the best ways to organize K-12 education, particularly at the high school level.

THE PRESENT: COMPETENCY EDUCATION IN THE CURRENT CONTEXT

Although rich in historical precedent, today's competency education is an emerging field in which various implementers define their models somewhat differently and maybe even use different names, calling their programs "mastery based" or "proficiency based." Some skeptics question whether it is fair to characterize competency education as a coherent movement at all. While any attempt to define an evolving field is destined to be incomplete, it is important for the purposes of this paper to describe the major elements of competency education in play today.

A Definition, Under Construction

Many educators and researchers now consider competency-based models as existing on various axes of time, place, and personalization. For example, the purest definition of a competency-based use of time may be for every student to advance on an individual path based solely on mastery. However, recognizing the potential administrative, learning, and social drawbacks, not all schools adopting competency-based approaches do this. In practice, different schools with different populations and priorities have developed distinct versions. Some competency education models "value group learning and a sense of classroom community as much as purely individualized progression" (Priest, Rudenstine, & Weisstein 2012, p. v). Others emphasize flexible schedules or project-based learning. Given the relatively young nature of the field, we do not yet have the data to pinpoint exactly where along the various continua of path, pace, time, and place the most effective learning outcomes occur (Calkins 2014).

Despite the differences among models, certain characteristics are fundamental. For the purposes of this investigation, we first suggest features that are core to any competency-based model. Given our interest in promoting rigorous student-centered approaches that lead to better college, career, and civic outcomes, we next identify the key elements in a personalized version of competency education that align with our findings in research from the cognitive and learning sciences.

Distinguishing Among Similar Terms⁶

Competency education = Competency-based = Mastery-based = Proficiency-based ≠ Standards-based or Outcomes-based

This paper primarily uses the term "competency education." We consider it synonymous with "competency-based," "mastery-based," and "proficiency-based" education, referring to educational approaches that prioritize the mastery of learning objectives regardless of how long it takes.

We distinguish these terms from "standards-based" or "outcomes-based" approaches, which also emphasize mastery of learning objectives, but tend to judge mastery differently. For the most part, this second set of descriptors are applied to systems in which performance is translated back into grades or numeric averages and remains coupled with time-based accountability.

We recognize that some researchers draw even more nuanced distinctions among these various terms; while some practitioners may call their school standards-based when its overall elements may be closer to what we would consider competency-based. While we cannot resolve these issues here, it is our goal to be clear and consistent in our use of the terms and concepts we hold critical to the endeavor.

CORE ELEMENTS OF COMPETENCY EDUCATION

At its core, competency education has three basic elements, all of which were also part of older proficiency-based educational models:

1. **Mastery:** Students advance to the next level, course, or grade based on demonstration of skills and content knowledge as outlined in clear, measurable learning objectives that hold all to the same high academic standards.
2. **Pacing:** Students progress at different rates in different areas, rather than on a teacher-driven, class-wide schedule. Students who do not demonstrate mastery of a competency on the first attempt continue learning and have multiple opportunities to try again.
3. **Instruction:** Students receive customized supports to match their individual learning needs to keep them learning increasingly challenging material in a developmentally appropriate and motivating manner—and to ensure that those struggling in any area will be able to reach proficiency.

ELEMENTS OF PERSONALIZED COMPETENCY-BASED EDUCATION

Today's competency education models frequently include several other elements, often incorporating high degrees of personalization, to foster engagement, motivation, and responsibility for one's own learning. Personalized approaches to competency education include some or all of the following elements:

- > **Competencies:** Learning objectives reflect research on what students need to know, and be able to do and apply for college, career, and civic success, including cognitive, metacognitive, non-cognitive, and interpersonal skills.
- > **Assessment:** Multiple measures are used to determine mastery, and formative assessments play a particularly important role in instruction. Students receive immediate feedback about their progress toward specific competencies, and return to difficult concepts and skills until they can demonstrate proficiency.
- > **Time:** Flexible uses of time encourage learning experiences outside of the traditional school day and year, and in a variety of formal and informal settings.
- > **Agency:** Learners have opportunities to exercise choice in how they engage with core concepts and demonstrate core competencies.
- > **Technology:** Schools and students use technological tools in service of flexible and engaging instruction and to ease implementation challenges. Software can support the tracking of demonstrations of competency. It also may provide recommendations for learning experiences, based on student progress data.
- > **Culture:** School leaders and teachers foster an education environment that includes high expectations, transparency of learning objectives and assessment, collaborative learning and leadership, continuous improvement, and opportunities for students to learn meaningfully with peers and form relationships with supportive adults in order to maximize motivation, engagement, and achievement.

Distinguishing Among Similar Terms⁷

Individualized = Customized ≠ Personalized

Creating a consistent language for any emerging field can be tricky. For this paper, we use individualized and customized synonymously, to refer to teacher-led instruction that is designed to meet the unique learning needs of each student.

We distinguish both of these terms from personalized, which we use to describe broader educational approaches that connect learning with the interests, talents, experiences, and aspirations of each student and that involve the active participation of each student in the design of their learning.

We recognize that some researchers draw even more nuanced distinctions among these various terms; and the very meaning of personalization is in flux. While we cannot resolve these issues here, it is our goal to be clear and consistent in our use of the terms and concepts we hold critical to the endeavor.

An Illustration of the Core Elements of Competency Education

For over 17 years, Boston Day and Evening Academy has served a population of young people often left behind: those who are off track to high school graduation or who have dropped out altogether. From day one, BDEA has used a competency-based approach as a way to accelerate student progress toward graduation and postsecondary success, as well as foster deep learning and critical thinking. Below is a table illustrating how they define and measure competency. Massachusetts, a Common Core state in the PARCC consortium, has set out numerous standards a student must meet in content areas, such as the English Language Arts (ELA) for example, in order to be considered ready to graduate. BDEA takes those standards and breaks them into core competencies, often slightly rephrased in more concise and accessible language for their faculty and students. Each competency has several benchmarks progressing from basic skills to more complex reasoning.

A student achieves *mastery* in each of these areas by demonstrating “understanding and application of specific skills and content independently, multiple times, and using the correct vocabulary” (Wolfe 2012, p. 12). A student will not receive credit for the full competency until she has demonstrated mastery of all the benchmarks. However, she may enter the school already ready to demonstrate mastery in all the “1’s” (Benchmarks column); she may take two weeks to breeze through 2c; and she may find it makes sense to work on 2b and 3a at the same time; thus finding the right pace for her learning needs. Her ELA teacher and her Advisor meet with her regularly during a regular class period or in the course of frequent reviews of her Individualized Learning Plan (ILP). These ILP checks keep her progressing at an appropriate pace to move her through to the higher level benchmarks. These meetings and others with the Student Support Team further ensure she has the individualized instruction she needs such as proper tutoring supports, opportunities for structured collaborative group work, and time to revise so that she can meet her benchmarks.

STATE STANDARD	COMPETENCY	BENCHMARKS
<p>DEFINITION: The competency as expressed in the state standards for learning</p>	<p>DEFINITION: The competency as expressed in the state standards for learning</p>	<p>DEFINITION: The building block skills students need to acquire and demonstrate to master the competency. Numbered in the order in which a student would most likely develop the skills.</p>
<p>EXAMPLE: Analyze the meaning of literary texts by drawing on knowledge of literary concepts and genres.</p>	<p>EXAMPLE: Identify and analyze different literary elements and genres.</p>	<p>EXAMPLES: 1a. Identifies at least three different literary forms. 1b. Identifies and understands the basic literary elements of a text (plot, setting, character, conflict, mood, tone). 2a. Identifies the characteristics of at least three genres. 2b. Identifies themes and analyzes their development over the course of a text. 2c. Uses textual evidence to identify and analyze figurative language and/or other higher-level literary devices. 3a. Identifies and analyzes the connection of the text’s theme(s) to an essential question.</p>

Source: Wolfe 2012, BDEA

What Is Driving Interest and Investment in Competency Education Today?

The growing interest in competency education has generated increasing investments in competency-based models. In the past decade, 42 states have granted public schools the flexibility to incorporate competency education policies, and a few states have moved beyond experimentation (Carnegie Foundation 2014). Proponents are implementing a range of programs, from competency-based options within a school to district-wide efforts. New Hampshire has gone the farthest, launching a statewide competency-based system in 2008 that requires all high schools to award credit based on student mastery of material rather than time spent in class (Freeland 2014). Maine is mandating that districts offer a diploma based on demonstration of proficiency beginning in 2018.

At latest count, 29 states allow each district to choose how to award credit—using seat time or an alternative, such as proficiency or competency. (See *box on state policies*.) Some of these states are actively encouraging schools to adopt competency-based pathways. Iowa recently selected 10 districts to develop pilot programs and will follow their progress as a task force studies broader implementation (Iowa DOE 2013).

The federal government also has encouraged competency education, making it a feature of the Race to the Top competition and holding it up as a promising strategy to produce more and better-prepared graduates (DOE 2012a). Several major educational foundations are supporting this movement, funding expansion and research (including this paper). While most schools are too new to have a long track record, early adopters are showing some signs of success.⁸

Today's demand for competency-based reform efforts can be traced to a confluence of several drivers of change. First and foremost, the interest is fueled by the expanding global economy, which has transformed the U.S. labor market over the past decade. The increased importance of college and career readiness for all students is broadly accepted. The recognition that most jobs soon will require postsecondary credentials has raised the stakes; graduating from high school is no guarantee of finding any job, let alone a job that pays enough to support a family or leads to a career that does.

State Policies on Seat Time and Course Credits

All 50 states and the District of Columbia have rules about how districts should award high school course credit:

- **1 state** (New Hampshire) eliminated seat time, or the Carnegie Unit, from its regulations and as of 2008 requires all high schools to award credit based on student mastery of material rather than time spent in class.
- **1 state** (Maine) will require districts to offer a diploma based on demonstration of proficiency beginning in 2018.
- **40 states** allow districts to define credit more flexibly than the seat time standard
- **29 states** permit districts to define credits according to their choice, using seat time or another measure, such as proficiency or competency.
- **4 states** allow districts to apply for waivers to use measures other than seat time to award credit for core courses.
- **7 states** give districts some flexibility, but it is limited to special circumstances, such as credit recovery programs or out-of-school learning, and may require approval from the state.
- **8 states** and the District of Columbia do not give districts any flexibility; districts must use time-based credits.

Source: Carnegie Foundation for the Advancement of Teaching 2014; Stump and Silvernail 2014.

Determining how to help all students reach this goal has been the subject of intense debate. Two approaches to educational reform that have often been at odds—the standards movement and the personalization movement—are now coming together and raising interest in competency education as a part of the solution. Competency-based approaches provide reconciliation by accepting the central importance of clearly defined college- and career-ready proficiency standards for all and offering strategies to reach these standards through meeting the individual needs and interests of each learner. The ongoing development of advanced technological tools finally makes it feasible to implement on a large scale.

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The Standards Movement

The standards movement, which grew out of the 1983 publication of *A Nation At Risk*, has gone through several phases since its inception. Most states developed their own standards and standards-based assessments in the 1980s and 1990s. Some experimented with innovative performance-based assessments that would be “tests worth teaching to.” But these efforts were eventually dropped in favor of more cost-effective multiple-choice assessments that most states were using.

In 2002, the No Child Left Behind law raised the stakes and led to growing critiques of what was being done in the name of standards-based reform. Critics pointed out that the rigor of the standards and assessments varied dramatically across states, as did the bar for proficiency. Analyses found that many states were setting low to middling expectations—particularly in early grades that required high-stakes tests—as well as low bars for annual progress, in order to avoid sanctions (Adkins 2007; Carey 2007). In addition, some parents and teachers expressed concern about teachers spending too much time on test prep and narrowing the curriculum to teach to the test.

With increasing pressure to improve the inconsistent and low academic expectations that had taken hold across the country, political will grew once again for a set of nationally recognized learning standards. In 2010, most states signed up to design common standards in English language arts and math—an effort led by membership organizations such as the Council of Chief State School Officers and the National Governors Association. The Common Core State Standards aim to align with college-ready expectations and the demands of the global economy. The federal Race to the Top competition encouraged and rewarded states that adopted the standards, and by mid-2011, almost every state had done so. Nearly all the states, likewise, are taking part

in one of two consortia to design common assessments for the new standards and the more recent Next Generation Science Standards.⁷

Schools and districts that have implemented key components of competency education use the Common Core or other high-quality standards that emphasize higher-level concepts and deeper learning skills over basic skills and factual knowledge, as a basis to determine academic expectations in a course, subject area, or grade level (Great Schools Partnership 2014). Supporters of the Common Core within the competency-based education community say it will encourage consistency in developing, teaching to, and assessing competencies that are grounded in high-quality standards (Priest, Rudenstine, & Weisstein 2012). However, it is important to note that standards themselves do not define the level of performance required to show proficiency on learning goals. Each state is coming up with its own definition of proficiency and the minimum score a student must earn on state assessments in order to demonstrate it.

Personalization

Personalization and standards-based reform do not, on their face, seem to go together. In fact, as noted previously, the ways in which many schools responded to the first waves of the standards movement led to greater standardization and a narrowing of the curriculum. Some educators hold similar concerns about the Common Core. Increasingly, educational and state leaders see personalization as an antidote—essential to successfully implementing higher standards.

Adding higher standards to traditional education systems without personalizing instruction to help students attain them is likely to continue to produce inequity and large groups of underprepared graduates (Farrington & Small 2008). Faced with the need to help all students to meet

these more ambitious standards, educators and state leaders are increasingly seeing the need to use more personalized methods of teaching, as well as to use time more flexibly, both within and beyond the standard school day and year—essentially student-centered learning.

Students (and their parents) want an interactive, flexible, and engaging, and motivational educational experience that meets their needs and builds on their interests. That is the goal of personalization: Students' learning experiences—what they learn, and how, when, and where they learn it—are tailored to their individual developmental needs, skills, and interests. Although where, how, and when they learn

might vary according to their needs, in a fully personalized system, students also develop deep connections to each other and their teachers and other adults. Many applications of personalized learning emphasize the use of technology to enable the level of customization at scale (adapted from Gates Foundation 2010, Benson 2013).

Given what we know about learning differences and inequitable learning progressions, it is nearly impossible to imagine combining personalization and rigorous standards for all students without relaxing the drumbeat of time through a more competency-based system.



The growing interest in competency education is related to the advancement of technologies that make personalization more feasible—both in terms of meeting the interests and needs of students and providing an individualized learning management system for teachers.

Technology

Finally, the growing interest in competency education is related to the advancement of technologies that make personalization more feasible—both in terms of meeting the interests and needs of students and providing an individualized learning management system for teachers. In fact, some reformers advance an efficiency argument and see the potential for new educational technologies as the key to delivering individualized education in a cost-effective way. Students in technology-driven competency-based models primarily work independently, guided by an online curriculum offering standardized learning progressions with aligned computerized assessments. As the student moves through lessons and assignments, the learning management system also may suggest interventions or additional resources.

However, as we discuss in detail in the final section, “The Promise,” these types of online competency-based models tend to overemphasize the use of technology and individualization, often to the detriment of other key learning elements of a personalized competency-based approach such as collaboration, teacher interaction, and ownership of their learning trajectory (DOE 2010).

Nevertheless, without the kinds of technology available today, it would be nearly impossible to achieve the level of learning customization, varied and engaging experiences and lessons, and ability to assess and track the numbers of students necessary to realize personalized competency education at scale.

In many ways, competency education is a sweeping reform, going well beyond the standards movement, which did not try to change use of time in school or to challenge the fundamental ways in which public education is organized. However, as we discuss in the next section on historical attempts to measure outcomes in school, it is important to remember that many of the ideas that undergird competency-based education are not new. Yet, whether because of technical, adaptive, or political challenges (or all three), competency education has stayed on the sidelines, never becoming widely adopted or challenging the fundamental construct of time as the unit of schooling in the past. As we consider the opportunity to spread personalized competency education, it is important to understand the challenges that have hampered its growth in the past, and its potential to yield improved outcomes for students—particularly those who have long been underserved by public education.

THE PAST: THE ROOTS OF COMPETENCY EDUCATION

Despite myriad efforts to improve public secondary education, the fundamental structure of high school has stayed the same for more than a century: four years of coursework culminating in graduation for students who earn passing grades. Yet efforts to ensure that schooling emphasizes outcomes (learning) more than inputs (class time) also have deep historical roots.

As the twentieth century dawned, the benefits of the turn-of-the-century standardization in high schools were readily apparent: efficiency in serving the expanding and increasingly diverse student population, ease of record keeping, a rational method of organizing and managing large schools, and uniform university admissions standards. However, to educational progressives, the drawbacks were equally evident: the tamping down of the more individualized, self-paced learning they promoted.

In the early 1900s, John Dewey, whose ideas were central to the progressive movement in education, challenged traditional teaching models that relied on rote learning. Dewey wrote extensively about the importance of allowing students to learn by doing and of relating the curriculum to their interests and experiences. Around that time, and as a result of Dewey's influence, progressive educators were placing increased emphasis on whole-child development and real-world engagement, in addition to algorithms and facts.

One of the first significant experiments in mastery-based learning began in 1919 under Superintendent Carleton Washburne in the school district of Winnetka, Illinois, a village outside of Chicago settled by well-educated, reform-minded intellectuals from New England. Washburne had studied under Frederic Burk, the first president of the San Francisco State Normal School, a teacher-training college that became known for its individual instruction techniques. Burk developed self-instruction booklets—later called “workbooks”—to allow students to progress at their own pace (Graham 2005). Washburne took these ideas and developed “The Winnetka Plan” to emphasize individualized learning in elementary school. The school day was divided so that for at least half of the day students progressed at their own rate in “common essentials,” such as reading,

writing, and counting, and needed to master the material in each “work unit” to progress to the next level (Corcoran 1927). The rest of the day was devoted to creative group activities in social studies, literature, and the arts. Despite its self-paced component, it is notable that Washburne did not fully disrupt the time-based structure upon which American schooling had been built. Students who had not mastered the objectives in those work units by the end of the school year still advanced to the next grade.

However, the program was criticized for not going far enough: while instruction was individualized in that students worked independently on assigned tasks at their own pace, students' individual interests were not really taken into consideration nor did students guide their own instruction (Kliebard 2004; Kilpatrick 1925). The Winnetka Plan also heavily emphasized specific skill attainment in its common essentials in a mechanical approach that did not have any real connection to the creative group activities of the program (Corcoran 1972; Kilpatrick 1925). Despite these criticisms, the Winnetka Plan helped introduce self-paced instruction and was one of the first models to emphasize ensuring that all students master common skills needed for success. Important not only as an early precursor to the mastery-based movement, comparative studies later showed that students at least did not fare worse than in the so-called Normal schools (Tyler 1949).

Since then, several influential educators have championed more competency-based and student-centered approaches to teaching and learning that may have been a critique or expansion of the Winnetka Plan. In 1949, Ralph W. Tyler presented the concept that curriculum should be dynamic, always under evaluation and revision, rather than a static, set program. His work challenged the orthodoxy of the time by describing learning as taking place through the actions

of the student, rather than the teacher. Tyler advocated for developing clearly stated objectives that were to be “a compromise” between the characteristics and needs of the students and the basic skills and knowledge or common essentials that had typically driven curriculum and instruction (Tyler 1949). Thus, Tyler set the course for objectives-based education that drew not only on common skills and content, but also the needs and interests of students. Tyler went on to influence national education policy and assessment throughout the 1950s and 1960s, and his work made major contributions to curriculum and instruction that continue to this day (Tyler 1949; Nowakowski 1983).

Each of these major elements in Tyler’s reforms—greater focus on students’ needs and interests, dynamic curriculum, and clear objectives—are direct influences on today’s competency-based designs. Another major competency-based influence in developing the way that educators thought about instruction was John Carroll, whose 1963 “model of school learning” argued that aptitude is measured by the amount of time a student needs to master a given task or concept. In contrast with perspectives that put the primary focus on innate intelligence, Carroll’s model promoted the idea that academic achievement was a function of the appropriate opportunity—or time available—to learn, combined with high-quality instruction and student perseverance (Carroll 1963; Carroll 1989). Carroll’s conceptual model provided the theoretical basis for mastery learning (Bloom 1968; Block & Burns 1976). Another central idea in Carroll’s learning theory—that not all students achieve mastery at the same time—is also a central element of competency-based education.

In the late 1960s and early 1970s, the concept of the “open classroom,” or “school without walls,” was also gaining popularity. With roots in the one-room schoolhouse of early America and in a British approach called “informal education,” the open classroom mirrored the era’s social, political, and cultural challenges to authority and conformity (Cuban 2004). These student-centered programs typically offered no whole-class instruction, detailed curriculum, or uniform learning standards. Instead, children explored books, activities, and social interaction at “interest centers,” learning at their own pace with the guidance of teachers. While soon abandoned due to the conservative backlash against the cultural and political changes that created them (Cuban 2004), open classrooms shared the ideal that students learn best when they are directing their own learning. In practice, results were mostly mixed (Horwitz 1979). Research on open classrooms was often complicated due to the range of how open classroom education was implemented and defined (Horwitz 1979; Reynolds, Hayes, & Donny 1974). Many also questioned whether standardized assessments provided a valid measure for students not in traditional classrooms (Horwitz 1979; Wright 1975). These issues are similar to some of the assessment and accountability challenges current competency education efforts try to address. Competency education borrows much of the theory about increased time and student-centered approaches from the open classroom ideals, while simultaneously placing far greater emphasis on achieving mastery of clearly defined and rigorous knowledge and skills.



Competency education borrows much of the theory about increased time and student-centered approaches from the open classroom ideals, while simultaneously placing far greater emphasis on achieving mastery of clearly defined and rigorous knowledge and skills.

HISTORY TIMELINE: FROM STANDARDIZATION TO COMPETENCY EDUCATION

DATE	DEVELOPMENT
Late 1800s	Booming enrollment leads to standardization of secondary education . Credits awarded based on time spent in class (seat time) and any passing grade.
Early 1900s	John Dewey and Progressive educators challenge traditional teaching methods that relied on rote learning. Instead they emphasize whole-child development and real-world engagement .
1919	Carleton Washburne launches “The Winnetka Plan,” one of the first major experiments in self-paced learning and a precursor to the mastery-based movement.
1949	Ralph Tyler advocates for a dynamic school curriculum, with clear objectives drawing on common skills and content—and the needs and interests of students .
1963	John Carroll presents ideas that achievement is not a function of innate ability, but of time available to learn combined with high-quality instruction, student perseverance.
Late 1960s	“Open classroom” models focus on “learning by doing,” exploring “interest centers” at a student’s own pace, with teacher guidance .
1968	Benjamin Bloom publishes “Learning for Mastery,” which lays a foundation for organizing schools to allow individual students the time needed to meet objective learning goals .
1970s	Bloom’s strategy for mastery learning emphasizes group-based instruction, interim assessment, and individualized “corrective activities,” followed by a second assessment to evaluate progress. Students do not move ahead without peers.
1970s	Fred S. Keller proposes far more individually paced mastery-based approach. The Personalized System of Instruction divides material into self-contained modules, with specific learning objectives. Students advance only after mastery of previous module.
1970s-1980s	Heyday of mastery learning. Extensive research finds impressive learning gains. Early criticisms included a lack of commonly recognized, highly specific educational goals, and of diagnostic, assessment, and progress tracking tools.
1980s-1990s	Beginning of “standards movement,” which sets what students should know and be able to do as they move through school and assesses their achievement in certain grade levels. First time states require common educational goals.
1994	Chugach, Alaska, launches performance-based learning system that is forerunner of today’s competency education models . Achievement improves dramatically. Similar models evolve in individual schools around the country.
2008	New Hampshire is first to launch statewide competency-based system that requires high schools to award credit based on mastery of material rather than seat time and passing grades.
2014 and beyond	Maine will require districts to offer a diploma based on demonstration of proficiency by 2018 . In 29 other states, districts may choose how to award credit, using seat time or an alternative such as competency or proficiency.

Mastery Learning

The basis for today's competency education movement gained momentum in the 1960s in the form of "mastery learning," with a renewed emphasis on teacher training that would allow students to master material at their own pace. In 1968, Benjamin Bloom published his seminal theoretical piece "Learning for Mastery," which challenged the prevailing notion that one-third of students will fail, an expectation he called "wasteful and destructive" (Bloom 1968, p. 1). Influenced by the work of John Carroll, he hypothesized that 95 percent of students can master what schools have to teach them if given appropriate time, feedback, and instructional methods. "Learning for Mastery" laid the foundation for how schools might organize to ensure more students reach those higher levels of learning.

The 1970s saw the rise of several distinct types of student-paced instructional models, including Bloom's strategy for

mastery learning. His group-based approach suggested ways for teachers to offer many of the positive aspects of one-to-one, individualized tutoring in a classroom setting (Bloom 1968; Bloom 1971). Under Bloom's model, the teacher delivers initial instruction to the class as a group, then tests each student's learning through formative assessment, which gives them individual feedback on what they have learned well and on what they need additional work. The formative assessments are paired with "corrective activities" that can be individualized for students and are followed by a second formative assessment within one or two class periods. This second assessment demonstrates whether the correctives were helpful and can serve as a powerful motivator by offering students a second chance to succeed. Students who master the material on the first try engage in enrichment activities to broaden their learning, but typically do not move ahead to the next unit without the rest of the class (Guskey 2010).



Bloom challenged the prevailing notion that one-third of students will fail, an expectation he called "wasteful and destructive." He hypothesized that 95 percent of students can master what schools have to teach them if given appropriate time, feedback, and instructional methods..

At roughly the same time, Fred S. Keller proposed a far more individually paced mastery-based approach. The Keller Plan, or Personalized System of Instruction, sought to create a self-paced educational program by dividing the unit material into self-contained modules, with clear, specific learning objectives. Students advance to new material only after achieving mastery of the previous module. Lectures and demonstrations are used to motivate students rather than as the primary vehicle of delivering information. Teachers take on a supervisory role. They develop curriculum, plan instruction, create exams, evaluate student progress, and supervise proctors, who work closely with students. Proctors administer and immediately score tests, then provide feedback and tutor students to fill

skill gaps (Keller 1968). Keller's Personalized System of Instruction was more commonly used in higher education settings, likely because it was developed in postsecondary classrooms (Keller 1968) and this individual-pace approach to instruction was difficult to adapt to typical elementary and secondary settings where teachers had classrooms of 25 or more students (Guskey & Pigott 1988).

Positive results and two potential models (Bloom and Keller's) resulted in the 1970s and 1980s being a heyday for this type of mastery learning. Extensive research summarized in several major meta-analyses found impressive gains in student learning outcomes, as well as in students' attitudes toward learning and in their abilities to learn (Guskey & Gates 1986; Guskey & Pigott 1988). An

analysis in 1990 of 108 controlled evaluations concluded that mastery learning not only has positive effects on achievement, but that the effects are stronger on the weaker students in a class (Kulik, Kulik, & Bangert-Drowns 1990a). Although one review found no effect on student achievement (Slavin 1987), the study methods were later questioned and the consistently positive impact of mastery learning has been upheld (Kulik, Kulik, & Bangert-Drowns 1990b; Guskey & Pigott 1988).

Despite strong evidence of its value, widespread adoption of mastery learning has faced significant obstacles. Criticisms voiced in the 1970s included a lack of commonly recognized, highly specific educational goals; scarcity of diagnostic, assessment, and progress tracking tools; lack of high-quality remediation models for students who advance more slowly; and lack of teacher time, energy, and skills to apply the model effectively (Horton 1979). However, these were offered as possible problems, with no evidence offered

to support these contentions at that time or since. The combination of positive evidence coupled with significant criticism suggests that the mastery movement largely faced a political problem, not an instructional or outcomes-based one.

In many respects, the current competency education movement seeks to pick up where the mastery learning movement failed to take hold. A more recent critique suggests that the potential impacts of mastery learning suffered from an over-emphasis on marching through sub-skills with little or no attention to the bigger concepts (Conley, forthcoming). Today's competency-based proponents maintain a laser-like focus on college and career-ready standards via the Common Core State Standards and other rigorous state standards. And as noted above, many competency education models simultaneously emphasize personalization—bolstered by recent findings in brain research, learning, and motivation theory.

Modern Forerunners: From Chugach to Boston

The first modern model of competency education was created far from the big cities that are the center of most educational reform efforts today.

Twenty years ago, the impoverished school district of Chugach, Alaska, which spreads over 22,000 square miles near Anchorage, moved to a performance-based learning system as a strategy to combat low achievement. Ninety percent of the district's 214 students could not read at grade level. The district replaced credit hours and grade levels with 10 performance levels, and created, implemented, and fine-tuned thematic units, tools, assessments and instructional approaches to match. Within 5 years, the district saw impressive gains in student achievement. Average ELA scores on the California Achievement Test soared from the bottom quartile to the 72nd percentile, and participation in college entrance exams increased from 0 to 70 percent. Teacher retention rates also rose (NIST 2002).

Chugach's success led to the 2002 creation of the Re-Inventing Schools Coalition, which refined and formalized the model, a competency-based approach now used in 16 districts and schools nationwide (Worthen & Pace 2014; DOE 2012b).

The same year, Oregon became the first state to allow students to earn proficiency-based credits, primarily for out-of-class learning experiences. The state has gradually expanded proficiency-based options since then, running pilot programs in 7 districts and later permitting districts to offer proficiency-based diplomas. (Oregon DOE 2011).

Before other states followed suit, individual schools—often alternative schools—started experimenting with competency-based programs. Boston Day and Evening Academy, which was created in 1995 as a night school for former dropouts, was one of the early adopters (see *more on BDEA in box on page 5*). Diploma Plus, now a national network of alternative schools, also started in Boston in 1996 and moved to a competency-based model a few years later. BDEA, Diploma Plus schools, and others have won flexibility from their districts to meet the needs of their students in ways that large, comprehensive schools could not and have become leaders in the competency education movement (Sturgis & Patrick 2010).

THE RESEARCH: IMPLICATIONS FOR COMPETENCY EDUCATION

As noted in the introduction, we view competency education as one important part of a broader vision of education reform that places students at the center of learning. We turn now from a look back at history to a look forward—at how recent research into student-centered learning approaches can inform efforts to implement competency education. In this section, we highlight relevant findings on learning, motivation, peer interactions, and assessment from our student-centered learning series and discuss implications for expansion of personalized competency education. Our intent is to call attention to lessons learned about effective educational strategies and show how they can be integrated into competency-based models that result in deeper learning outcomes for all students.

The Learning Brain⁹

Recent advances in neuroscience research have enabled students, educators, and parents to reconsider their notions about human intelligence, particularly the individual potential to learn. For much of the 20th century, the prevailing belief was that general intelligence was innate, or fixed at birth, as was the aptitude to learn in the academic disciplines. However, the field of neuroscience has shown definitively that the brain is highly adaptive, a property called “plasticity.” It is the interplay of genetics and the environment that sculpts the brain’s architecture and shapes individual abilities. Students’ brains continuously adapt to their experiences at school, home, workplaces, and other settings.

This means that, under favorable conditions, people can grow “smarter”—that is, raise their skill levels, even overcoming many learning challenges. As students learn, these experiences activate connections among neurons in certain areas of the brain. Over time, the more active connections are strengthened, becoming more effective, while the less active connections are weakened or eliminated. This research reinforces a basic principle of competency education—that students at all levels have the capacity to master a common set of core college- and career-ready skills and knowledge. Furthermore, competency-based strategies can offer the flexibility to provide meaningful educational experiences and ongoing guidance to support each individual as they follow their own path to mastery.

THE COGNITIVE SCIENCES	IMPLICATIONS FOR PERSONALIZED COMPETENCY EDUCATION
The brain is continually changing as learning experiences shape its architecture. Individual abilities are not fixed at birth, but rather continuously developing.	Provide meaningful and flexible learning experiences, with ongoing guidance, that enable students at all levels to build toward mastery of a common set of core college- and career-ready skills and knowledge.
The brain’s active engagement is a prerequisite for learning. Passive experiences do not trigger the neurological changes that underlie learning.	Prioritize active, engaging learning experiences that are relevant to students’ lives and goals. Include experiences that take place outside of school, and beyond the traditional school day.
Each student has a complex and dynamic profile of strengths and challenges, and ability in one area does not predict ability in another. Individuals learn most effectively through experiences tailored to their needs and interests.	Customize instruction, pacing, and supports to accommodate individual differences. Students can move ahead in some academic areas, while receiving extra help in others as needed.

ACTIVE AND ENGAGING EXPERIENCES

According to neuroscience research, learning is most likely to occur when experiences are active rather than passive, and when the learner is actively engaged, not a passive recipient of information. Today's scientific advancements allow us to confirm what 100 years ago John Dewey was describing from a psychological perspective: The brain requires active engagement to trigger the neurological changes that underlie learning. This research is consistent with the core principle of competency-based education—that students should earn credit for their mastery of specified knowledge and skills, rather than for spending a prescribed amount of time in a classroom and earning any passing grade. As with all student-centered approaches to learning, competency education at its best creates opportunities for students to engage in learning experiences that are relevant to their lives and goals. These do not only occur inside the school building during standard school hours. Learners are actively engaged at many other times and in many other places—after school, on weekends, and during the summer, when students participate in community activities, internships, and work.

INDIVIDUAL DIFFERENCES

As every teacher knows, students have a mind-boggling array of interests and abilities. Instructional techniques that work well for some students leave others lost. Research on the brain supports a nuanced understanding of individual differences. Not only does each classroom contain wide variations in students, but each student possess a complex and dynamic profile of strengths and challenges. One student may find mathematics easy, but wrestle with

writing. Another may face difficulty within a single domain—perhaps grasping graphs, but struggling with statistics.

Many teaching methods fail to accommodate these individual differences, as do standardized curricula, pacing, and assessments. Research on language learning, literacy, and mathematics suggests that everyone learns best through experiences tailored to their needs and interests. In a personalized implementation of competency education, instruction and pacing in each subject, and ideally curriculum and assessment, are customized to allow students to follow different pathways toward the same core knowledge and skills. Students can advance in some areas, while receiving extra help in others. Without this flexibility of time, a student's difficulties in one domain may unnecessarily interfere with learning in another.

Motivation and Learning¹⁰

Research shows that achievement and motivation are inextricably linked in a complex web of causality. Just as each student has a unique mix of abilities and interests, each student is also motivated in different ways at different times. Some enter school eager to learn; others need to be engaged in a particular subject to be motivated to explore it. Research indicates that systems of rewards and punishments and certain forms of praise are limited in their capacity to produce long-term positive changes in achievement motivation. However, when students are provided with opportunities for greater autonomy, agency, voice, choice, and challenge, especially within learning environments that encourage intellectual risk-taking and peer collaboration, both engagement and motivation can



As with all student-centered approaches to learning, competency education at its best creates opportunities for students to engage in learning experiences that are relevant to their lives and goals. These do not only occur inside the school building during standard school hours.

MOTIVATION THEORY	IMPLICATIONS FOR PERSONALIZED COMPETENCY EDUCATION
Every student is motivated in different ways at different times. To capitalize on individual motivations and meet individual needs, customized approaches that differentiate instruction tend to work far better than uniform techniques for the so-called “average” student.	Customize instruction and pacing to each individual’s interests, motivations, content needs, and learning style. These should include internships and other out-of-school experiences that allow students to explore their interests and develop their talents. Students are assured individualized support and scaffolding to keep them progressing appropriately.
Both intelligence and motivation are malleable. Helping students understand that they can master concepts, acquire new skills, and improve existing skills through the application of effort, regardless of past achievement, increases their motivation to try.	Provide multiple opportunities for students to demonstrate mastery of a competency—and its component skills and knowledge—and to move at different rates in different areas. Students see effort rewarded as well as mastery.
Providing opportunities for choice and control are potent strategies for increasing achievement. Students are likely to be more motivated and engaged in an activity when they feel a sense of agency—that they have a voice in how it is conducted and can affect how it concludes.	Help students feel a sense of control over their learning by allowing each to follow an individualized, transparent path to proficiency. Knowing in advance what outcomes are expected encourages students to become active agents of their own learning.
Each student has a complex and dynamic profile of strengths and challenges, and ability in one area does not predict ability in another. Individuals learn most effectively through experiences tailored to their needs and interests.	Customize instruction, pacing, and supports to accommodate individual differences. Students can move ahead in some academic areas, while receiving extra help in others.

soar (Toshalis forthcoming). To help each student meet his or her potential, it is essential to integrate these findings into competency-based classrooms and to allow students to choose—and shape—learning experiences outside of school.

Moreover, personalized approaches tend to work far better than teaching to the mythical average student. This is another central tenet of competency education—individualizing instruction, pacing, supports, and determination of mastery. “[K]nowing the individual student well enough to see how the web of causality functions to motivate him to achieve is crucial to teaching that student well” (Toshalis & Nakkula 2012, p. 3). Traditional classroom culture, in which a teacher attempts to guide every student to achieve common skills in the same time frame, is not designed with individual motivations in mind. Research also points to the fact that some students learn even the more basic skills more readily in non-school settings, such as youth-development-focused afterschool programs (Gutierrez & Irving 2013).

THE MALLEABILITY OF MOTIVATION

Like general intelligence, motivation is not fixed, but highly malleable and responsive to the environment, according to the conclusions of many studies. As Stanford psychologist Carol Dweck and others have shown, a student’s beliefs about his or her potential to learn can have a powerful impact on actual learning. Students who believe that intelligence is a fixed entity are more likely to attribute difficulty with a particular subject to evidence of lack of intelligence in that area, feel stuck, and give up. Such views continue to bolster common self-critical statements, such as “I’m not good at math.” Helping students to recognize that they can master new knowledge and improve existing skills by exerting effort—which Dweck calls a “growth mindset”—increases their motivation to try. It is effort and support, not innate ability or past achievement, which matters most. Students who believe this are likely to be more motivated to “attempt difficult academic tasks and persist despite setbacks, confusion, and even failure” (Toshalis & Nakkula 2012, p. 6, citing Dweck 1999; Grant & Dweck 2003; Kamins & Dweck 1999; Mangels et al. 2006).

Competency education at its best is well aligned with Dweck's mindset theory, as it provides multiple opportunities for students to demonstrate mastery of a competency and its component skills. Failure is not an option. Students may move at different rates in different areas, but eventually they will see their efforts pay off. Rather than waiting until the end of a unit, taking the same summative test at the same time as all of their peers, and earning a "C" or "D" (meaning they move to the next unit even though they understand only a small portion of the previous material and their self-confidence may be faltering), students can get feedback and try, try again until they master the material. Furthermore, motivation can spread across disciplines. "For example, students who are motivated in a particular class because they believe they are successful in it may then use these beliefs to orient themselves to learn in a different class" (Toshalis & Nakkula 2013, p. 178).

In these ways, competency education may be viewed as an antidote to the still-common practice of tracking, or sorting "unmotivated" or "less academically proficient" students into separate classes from higher-achieving peers. Tracking can lead "students to take on labels—both in their own minds as well as in the minds of their teachers—that are usually associated with the pace of learning (such as the 'slow' or 'fast' learners). Because of this, we end up confusing students' pace of learning with their capacity to learn" (Muir 2007, citing Wheelock). Looking at students' achievement levels at any given time as a predictor of "their achievement in the future becomes a self-fulfilling prophecy" (Muir 2007, citing Wheelock).

When schools make "ability differences" salient in learning environments, students may use a variety of techniques to void the implication that they are "slow" or "stupid." They may self-handicap, use avoidance behaviors, refrain from

asking for help, disengage, distract others, and, in some cases, act out. Conversely, such resistant behaviors drop off when students are not labeled, but rather get the supports and challenges they need to learn and demonstrate new concepts and skills (Toshalis forthcoming). Personalized competency-based approaches attempt to provide exactly this kind of customized support while doing away with the need for labels.

STUDENT AGENCY

Among the most potent strategies for increasing achievement is providing opportunities for student choice and control in school. Research has shown repeatedly that the more educators foster this sense of individual agency, the more student motivation and engagement are likely to rise. Teaching practices that emphasize the delivery and regurgitation of content have also been shown to have the opposite effect, leading to greater student passivity and disengagement. Best practice applications of competency education offer the opportunity for students to co-construct their own path into and through transparent learning progressions to specific outcomes laid out in common standards. These progressions provide a clear roadmap of the trajectory from novice to proficiency to graduation. Such progressions allow students to see their educational path as it unfolds; understand what is expected of them and what is on the horizon; and begin to feel a sense of control over their learning.

Social Aspects of Learning

Anyone past the age of adolescence knows viscerally the powerful influence of peers—for better and for worse. Despite their pitfalls, peer relationships are essential to the ability of teenagers to develop a sense of identity and belonging and an understanding of the world. Research

SOCIAL ASPECTS OF LEARNING

Peer interactions are essential to adolescent identity development, sense of belonging, understanding of the world, and academic learning.

Belonging to a "community of learners" can offer positive results for young people (particularly as studied in the field of mathematics).

IMPLICATIONS FOR PERSONALIZED COMPETENCY EDUCATION

Include regular peer interaction and meaningful collaboration focused on positive and rigorous learning experiences.

Allow the flexibility for students to "think aloud" with one another, get feedback on their thinking, and build knowledge together.

from a variety of perspectives underscores the critical importance of peer interactions to learning, as well. Providing opportunities to collaborate meaningfully with peers is a key element of quality learner-centered education and many educators believe it is crucial for making the most of competency-based education, too.

A recent meta-analysis of 148 studies (representing more than eight decades of research on over 17,000 early adolescents from many different countries) reinforces the benefits of cooperative goal structures over competitive or individualistic goal structures in promoting both academic achievement and positive peer relationships. Cooperative goal structures require students to interact while working on academic assignments, “thus building relationships while making academic progress” (Roseth, Johnson, & Johnson 2008).

Strong examples of the benefits of building a community of learners come from studies of afterschool mathematics programs, as well. Classes that use small-group instruction have shown greater effects than those with whole-group instruction or a focus on one-on-one tutoring (Gutierrez & Irving 2013). A three-year study of black and Latino/a middle school students in an afterschool program identified some of the positive features: encouraging students to discuss their thinking, hearing the range of other people’s perspectives, having their own thinking challenged, refining their thinking, expanding upon the arguments of others, and collaborating on problem solving (Mueller 2009; Mueller & Maher 2009).

A growing body of research supports the notion that students are more likely to persist, and to excel academically, when they feel a sense of belonging to an academic community. Such students are more invested in the learning process and have more positive attitudes toward school and classwork, as well as toward their teachers and their peers (Farrington et al. 2012). Though students in a competency-based school might be frequently regrouped to accommodate differences in learning pace, a thoughtfully designed, personalized system will explicitly call for the creation of consistent communities, too. These might take the form of advisory groups, extended learning opportunities outside of school, or age-based cohorts.

As the goal of high school education continues to shift from completion to college- and career-readiness, the importance of social, interpersonal, and collaborative skills continues to grow. One example: a 2006 survey of several hundred employers ranked “Teamwork/Collaboration” second overall in applied skills important for job success for new entrants to the workforce (Casner-Lotto, Barrington, & Wright 2006). In personalized competency-based systems, school-wide competencies include critical aspects of social learning, such as collaboration.

Assessment¹¹

Traditional assessment systems presume that all students progress at the same pace. They require all students to demonstrate how much they have learned on a summative test at the end of major units, and at the end of each course. Letter or number grades rate their performance.

BALANCED SYSTEMS OF ASSESSMENT	IMPLICATIONS FOR PERSONALIZED COMPETENCY EDUCATION
Student assessments should be part of a balanced system of formative, interim, and summative assessments—both formal and informal.	Offer multiple measures of mastery, at individualized intervals, rather than performance on a single time-based test. More radical versions also allow students to choose how to demonstrate learning.
Well-designed assessments are individualized, focused on learning and growth, motivating, amenable to students regulating their own learning, and useful to a variety of audiences. Detailed, task-specific comments on student work can activate student interest and result in better performance.	Offer individualized assessments focused on each student’s strengths, needs, and interests. These may provide not just overall measures of learning, but also useful feedback about what each student needs to do to keep moving toward mastery.
A variety of classroom-based assessments are associated with significant gains in student learning. These include self- and peer assessments, portfolios, assessments using new technologies, and formative uses of summative tests.	Use a variety of formative and summative classroom-based assessments in order to provide students and teachers with up-to-the-minute feedback on learning progress and with the most effective ways to demonstrate proficiency on common standards.

Such systems do not offer opportunities for reassessment, making students unlikely to attempt to master missing concepts after grades have been given, even though many students lack the academic foundation needed for what comes next (Sturgis 2014). Further, grades may have value as a reward, but low grades are not effective motivators. There is no research evidence that low grades prompt students to try harder. It is more common for low grades to prompt students to withdraw from learning (Guskey 1996, 2011).

How, when, and for what purposes students are assessed are vital issues in competency education programs. By design, there is no single determination of what assessment should look like and how it should proceed. Assessments can and do take a variety of forms, including traditional tests, computerized adaptive quizzes, performance-based tasks, self- and peer assessments, portfolios, and elaborate projects culminating in exhibitions to community audiences.

Advocates of competency education consider a transparent system of both formative and summative assessments—tied to common standards—to be foundational. They use multiple measures and demonstrations of progress rather than performance on a single time-based event. Students move on from a learning unit only once they have successfully demonstrated the requisite progress toward mastery, regardless of the time needed to achieve it or the progress of their peers. Evaluating students as “proficient” or “not yet proficient” rather than ranking students along the traditional A-F grade scale is meant to signal that all students can and will achieve success (Sturgis 2014).

A definition of high-quality *student-centered* assessment sets a high bar, stating that such assessment “is individualized, promotes learning and growth, motivates students, actively engages students in the regulation of their own learning, and is informative and useful to a variety of audiences.” A competency-based system affords the opportunity to build in many of these elements. By its nature relatively individualized, competency-based assessment allows students to progress at their own pace, demonstrating their learning at different times and potentially in different ways. Some schools or teachers allow students to choose or create their own demonstration of mastery within a rigorous set of guidelines. A student who struggles with traditional test-taking may want to give an oral presentation, while an introverted student may wish to write a paper.

Unlike traditional testing regimens, a competency-based system of assessment also relies on opportunities for feedback and revision. In addition to promoting learning and growth, the possibility for revision helps to increase student motivation. This contradicts the longstanding belief that traditional grades motivate students through competition and ranking everyone in relation to each other. In fact, an increasing body of research suggests that competitive learning environments are powerfully demotivating and disengaging for many students, particularly for those already marginalized in school (Roseth, Johnson, & Johnson 2008).

High-quality student-centered assessment also affords data for many purposes and audiences. Formative assessment seeks to provide both students and teachers with ongoing, day-by-day feedback, so they can track learning progress and modify curriculum and instruction as needed. This may include informal check-ins between student and teacher, short computerized exercises to measure understanding, or guided peer assessment.

Summative assessments, by contrast, typically occur less often in a competency-based education system, only once students feel they are ready to demonstrate proficiency. Though summative assessments are used as “gateways” to the next set of competencies or even to graduation, they can still serve a formative role. If a student attempts a summative assessment and does not reach the necessary level of proficiency, the teacher and student can use assessment information to help the student refocus efforts and fill gaps in knowledge and skill. In addition to their uses determining grades, advancement, retention, and graduation eligibility, these summative assessments can also be useful competency snapshots for administrators, policymakers, and the public to evaluate school performance on common standards.

Research on assessment, like that on motivation, student agency, and social learning helps to define by extrapolation the best practice applications of competency education. As the many versions now falling under the competency-based umbrella continue to grow, the field faces the difficulty of cohering under a single understood definition of high-quality approaches (to our mind, one that incorporates the elements of personalized learning); while simultaneously confronting political and implementation issues ahead.

THE PROMISE: NAVIGATING CHALLENGES, SEIZING OPPORTUNITIES

Competency education is currently one of the hot “innovation spaces” in education reform. In an attempt to ensure that these efforts are more lasting and widespread than previous rounds of mastery-oriented reforms, we have highlighted potential lessons from the factors that historically limited the growth and sustainability of such innovations and suggested how the work of building competency-based systems can be infused with new research and tools for learning, motivation, peer interactions, assessments, and more.

Some of the limiting policy and implementation factors of the past persist even now. We continue to wrestle with everything from developing nuanced assessments that can meet accountability demands to adequately supporting the most effective methods for traditionally underserved learners. At the same time, new opportunities exist to drive toward a more personalized vision of competency education; one that results in clearly improved learning outcomes for the full range of students—and that is feasible and affordable to implement widely. In this final section, we explore the political and implementation opportunities and challenges facing personalized competency-based efforts.

Policy Drivers and Political Challenges¹²

A number of major issues dominating today's education landscape will impact the national appetite for making the legislative and regulatory shifts necessary for a thriving competency-based system. Efforts to expand competency education must navigate: the ongoing implementation of the Common Core and related assessments; federal and state decisions about accountability measures; the scarcity of funding for and solid research on innovation; and the time typically required for innovations to grow, be evaluated, improve, and reach maturity.

COMMON CORE STATE STANDARDS

As noted above, the development of the Common Core and other state standards solves a central problem earlier mastery learning advocates faced: contending with many

disparate units of learning without clear agreement on the ultimate goal. With the introduction of the Common Core, educators are able to align their instruction, at least in ELA and math, to the same college- and career-ready standards used across the country. The hope of competency education reformers is that teachers, schools, and districts implementing the Common Core will turn to competency-based approaches as the best way to ensure all students have the time and support to reach the high standards (Hess, Gong, & Bayerl 2014).¹³

However, others may view the practical challenges of enacting competency education, which requires disturbing many of the traditional organizational elements of school, as disruptive to their efforts to help students reach high standards. Moreover, if the assessments under development to measure student achievement of the Common Core occur at particular moments in a student's career, they are likely to reify the limitations of traditional time-based systems. Led by New Hampshire and the Smarter Balanced Assessment Consortium, some states are considering whether to offer interim assessments and robust performance assessments to determine student progression—a critical need in a competency-based system.

ASSESSMENTS

Well before the Common Core debates, teachers and school leaders interested in creating competency-based or other similar systems grappled with how to measure mastery and conduct performance assessments in affordable

and valid ways for large groups of students. Hopefully as states tackle core assessment issues accompanying their implementation of competency education models, they will be able to build from those hard-learned lessons. For example, we know much more about how schools across a system can develop a shared understanding of proficiency and what that means for the content, rigor, and format of assessments.¹⁴ Furthermore, ensuring quality and reliability is more important than ever to mitigate the effects of high student mobility and to reassure colleges and employers of the merit of secondary school experiences of candidates for admission or jobs.

Other critical questions that must be resolved include how to balance reliability, cost, and efficiency. Fortunately, this work has already begun. Researchers, states, intermediaries, and funders are exploring how to craft assessments that meet both formative and accountability needs, and reflect the full range of knowledge and skills that go into college, career, and civic readiness in the 21st century.¹⁵

ACCOUNTABILITY

Since the passage of No Child Left Behind in 2002, accountability has dominated the educational landscape. Many districts have at least one low-performing school undergoing “turnaround” efforts, as the law prescribes, and some districts have multiple schools with this status. As states start to take advantage of seat-time waivers to implement competency-based reforms, working out accountability systems will still be a priority. For example, how should schools account for a student who takes longer than a year to reach proficiency in a certain subject area? How can districts implement multiple measures of competency and meet accountability demands? It is not yet clear how to make such changes while continuing to hold schools accountable for the academic progress of all their subgroups of students at specific points in time.

INNOVATION SPACE

Most states (42 at last count) now provide some measure of flexibility for schools to opt out of seat-time requirements and award mastery-based credits. New Hampshire and Maine have gone furthest by placing personalized competency education at the center of their improvement

For Your Consideration... Politics and Policy

Common Core State Standards

- What kinds of alignment will help the competency-based movement to be seen as supporting the Common Core and other standards efforts rather than distracting from them?
- What additional standards and competencies still need to be determined for a competency-based system and how will systems go about doing so?

Assessment

- How can we ensure that assessments are useful and actionable enough that they help both students and teachers improve?
- Can such a multifaceted assessment system be implemented at a reasonable cost?

Accountability

- How will schools be evaluated and held accountable for student progress in a competency-based system where time is a variable?
- What is needed to ensure locally developed and scored accountability measures provide rigor, depth of knowledge, skills, and transference across districts and into postsecondary settings?

Innovation Space

- How can we ensure the lessons learned from the early adopters are captured and shared?
- What is needed to protect the innovation space in the face of numerous and competing demands?

Funding

- What would need to change about teacher contracts and per-pupil budgeting in order to accommodate competency education?
- How do we determine whether competency-based models are cost effective (including a consideration of longer-term, cost-benefit analyses of intended outcomes)?

efforts. Other states, such as Iowa, are encouraging competency-based innovation in districts while studying the possibilities. Networks of states, districts, and schools, supported by both local and national organizations, are running pilots that are moving toward competency-based models in K-12 systems, starting with permitting greater flexibility in pacing and curriculum.¹⁶

These efforts contribute much to the energy, expertise, and enthusiasm for this innovation space. However, reaching greater scale has been limited by competing priorities and the long, complex process of persuading teachers, students, parents, and policymakers to make significant change. Particularly challenging is the lag time between implementation and evaluation, as outcomes data from early adopters is just starting to emerge. For current efforts to be successful and spread to more states, it is crucial that proponents secure policymakers' commitment and patience to protect the innovation space in the face of numerous additional demands.

FUNDING

Despite the make-or-break nature of financing innovation, there is little to no research yet available on the costs associated with personalized competency education.¹⁷ Nor is there documented discussion of the potential impact of competency-based approaches on traditional school finance models (often based on seat time) and teacher contracts (usually based on set hours and calendars). Some school systems have been extremely creative in finding workarounds through the complicated formulas used to calculate per-pupil spending to support students who earn credit in alternative ways, such as off-site internships, dual enrollment, or online courses. Yet few, if any, systems have confronted how to do such customization at scale for every student. Some newer experiments in student-based budgeting (also known as weighted funding) get closer to solving this issue, but most of these models still presume a relatively fixed time allotted for schooling. Before any competency-based system can grow to scale, we will need to know much more about both explicit and hidden costs and the effects on school funding systems.



The development of the Common Core and other state standards solves a central problem earlier mastery learning advocates faced: contending with many disparate units of learning without clear agreement on the ultimate goal.

Implementation Headwinds and Tailwinds

The research reviewed in the previous section points to the potential efficacy of competency-based approaches that personalize education to increase the engagement and achievement of the full range of diverse learners in our schools. However, significant implementation challenges may prevent these ideas from reaching their potential, even if the broader political and policy issues are resolved. These challenges include: training teachers in new approaches, maintaining a supportive school culture, galvanizing community buy-in, and maximizing the advantages and minimizing the disadvantages of technology.

TEACHING IN A COMPETENCY-BASED SYSTEM: INSTRUCTIONAL SHIFTS

Perhaps the single most important factor in the success of a personalized competency-based system is whether teachers have the opportunity to develop their expertise in competency-based approaches. It is not just initial training that matters, but also participating in an ongoing, supportive professional community where teachers continually receive feedback and hone their skills (OECD 2014). Effectively teaching in a competency-based setting calls upon teachers to embrace being learners themselves, to collaborate with others in non-traditional ways, and to be constantly evaluating their own practice.

The skills needed to teach in a personalized competency education environment are only beginning to be defined.¹⁸ However, they are likely to have much in common with exemplary practices of student-centered teaching that have been identified (Cervone & Cushman 2012). As student-centered teachers, those in a personalized competency-based system will need to support each student in developing a new relationship to learning—defined by increasingly complex challenges and growing autonomy. Ownership of learning and opportunities to relearn can motivate students, but teachers will need to be adept at maintaining motivation and providing effective supports for however long it takes struggling learners to see tangible signs of progress. Teachers also need the know-how to coach adolescents to develop the mindsets and self-regulation skills to become increasingly independent and self-directed learners. No teacher preparation programs we have identified provide explicit instruction on teaching in competency-based settings, although some are beginning to include more coursework on related concepts, such as developing mindsets, self-regulation, and other metacognitive skills.

TEACHING IN A COMPETENCY-BASED SYSTEM: ADMINISTRATIVE SHIFTS

We now have a wealth of examples of ways that schools have shifted their school governance to the kinds of distributed leadership necessary for a successful competency-based school; infused their professional development with meaningful and teacher-led training; and fostered a culture of inquiry and exchange through increased common planning time, non-evaluative classroom observations, and regular student work review.¹⁹

Yet, although a small number of schools have been pursuing modern-era competency education for almost 20 years, administrative issues remain a major hurdle. Common examples include implementing a manageable, streamlined system for tracking students moving at different paces, making time for customizing individual learning plans and supporting individual students, and integrating course schedules and competency assessments with state reporting systems. In addition, the increased mandates for and definitions of teacher evaluations frequently do not align with the kinds of pacing and assessment used in competency education. For some of these administrative challenges, technological advances may offer some hope.

TECHNOLOGY IN A COMPETENCY-BASED SYSTEM: INSTRUCTIONAL SHIFTS

Many proponents of competency education cite recent leaps in technology as a means to both expand instructional possibilities and ease administrative difficulties. There is growing support for blended classrooms that combine the best elements of face-to-face learning and virtual learning. One exciting example is the use of technology to enhance the teacher’s “toolkit” to promote engagement—often with peers across the city or across the world (LaBanca et al. 2013; Darling-Hammond 2010).

Despite its significant role in making competency education possible, technology is no replacement for the teacher-student relationship. Numerous studies and reports have established the benefits of blended instructional settings that pay careful attention to the need for in-person mentoring, peer-group learning, and quality supports (DOE 2010).²⁰ Thoughtful and effective integration of digital tools requires teachers to be skilled at balancing individualized instruction with collaborative group learning, and at blending face-to-face learning with virtual instruction. Although some schools and online models of competency education are so individualized that students spend the vast majority of their time working alone to complete required tasks within learning progressions, the trend among competency education leaders is away from such an extreme version. While such models can be efficient and potentially lower costs, they do not take into account the importance of the social aspects of learning, both in reinforcing academic concepts and in contributing to college readiness and civic development.

TECHNOLOGY IN A COMPETENCY-BASED SYSTEM: ADMINISTRATIVE SHIFTS

Improvements in data management and Internet connectivity may be one of the most important factors in enabling competency-based innovations to be implemented at a far greater scale. Information infrastructures and data systems allow teachers and schools to track learning experiences and demonstrations of competencies far more efficiently now than even five years ago. While many traditional classrooms have begun to use technology to help manage information, developing new systems is even more crucial for competency-based classrooms, with their personalized learning plans, individualized pacing, and frequent assessments. Complex analytics systems can slice

and dice a single data set in different ways for different constituencies, ranging from parents to policymakers, significantly reducing the staff time required. Student- and teacher-facing dashboards that allow for up-to-the-minute progress tracking can help to motivate students to achieve, as they can see their efforts paying off in real time (Sturgis 2014).

However, it is important to note that these platforms are still in their infancy, and districts are usually forced to “bundle” them with other student information and tracking systems. This can result in prohibitive up-front and training costs, and some risk of incompatibility between systems. Furthermore, vendors do not have financial incentive to adapt their systems for smaller districts or pilots, slowing the pace of innovation. The Council of Chief State School Officers is leading conversations to define the field’s needs and spur more creative private software development, but these efforts are still early stage.

Furthermore, there are some administrative and organizational challenges even the best technology cannot supersede, such as reorganizing the school day, assigning teachers to new roles, and assuring sufficient time and quality for professional development. It is important to note that while digital platforms do exist, competency education will never be an “off the shelf” model. It will always require significant ongoing legwork at the school site and strong buy-in from the entire community.

LEADERSHIP, CULTURE, AND COMMUNITY

At the nexus of competency education implementation opportunities and challenges lies the role of the leader in shaping school culture and community involvement. Numerous studies in the past 15 years demonstrate how pivotal the school leader is in establishing a vision and a strong school culture if any reform is to take root and produce positive learning outcomes (Rice 2010; Leithwood et al. 2004). Effective leaders recruit, train, and retain the teachers who ultimately have the biggest single-factor impact on student learning.

For Your Consideration... Implementation

Teaching

- How, when, and where will prospective and current teachers develop the necessary competencies and capabilities to teach in competency-based classrooms?
- How do teacher preparation programs need to change in order to better prepare teachers for competency-based learning environments?
- How could evaluation and accountability measures for teachers support a move toward competency education?

Technology

- Do adequate platforms to manage the administrative side of competency education exist? If not, what is necessary to create them?
- What technical issues impede compatibility between competency-based systems and other accountability systems?
- What adaptive concerns must be tackled to support successful technology integration (i.e., training and cultural shifts)?

Leadership, culture, and community

- What is the role of school (and district) leaders in supporting teachers to develop and improve skills in competency-based settings?
- How do leaders establish a school culture that focuses on competency-based reforms amidst many competing demands?
- What do leaders need to do to bring parents and the community at large into the conversation?

Equity

- What are the critical equity concerns and what can be done to mitigate them?
- Where will the rise of technical solutions exacerbate unequal access to tools and resources?

At a time of overwhelming pressure on teachers, school leaders play a critical role in creating the vision and establishing the culture that can enable competency-based approaches to take hold. Numerous case studies and profiles of competency-based schools indicate the need for a leader capable of encouraging and supporting whole staff involvement in a distributed leadership approach (e.g., Center for Best Practices 2012; Priest et al. 2012; Wolfe 2012). However, education schools and certification programs are just beginning to shift toward this vision and are not yet training enough leaders to meet the growing demand.

Competency education also requires leaders to engage parents and community partners in meaningful conversations about educational goals and measurement. A recent report by the Maine Education Policy Research Institute highlights the critical nature of involving the whole school community in the shift to a competency-based system, the benefits of doing so, and the skill, time, and effort it entails (Stump & Silvernail 2014). As with most significant school-based instructional and design transformation, leaders who build and sustain a culture that embraces competency education may prove the crucial different between reforms that thrive and those that fade.

EQUITY

Many competency education advocates share the concern that the approaches could actually increase inequity when put in place at a large scale –even if implemented well. At least in the short run, achievement gaps between students of color, English language learners, special needs students, lower-income students, and their more advantaged peers are all but guaranteed to widen. Advanced students are expected to move ahead quickly while less advantaged or avid students may find themselves moving more slowly. However, personalized competency education, along with other student-centered approaches, can yield improved outcomes for these populations when the proper resources are in place. Meeting the persistent challenge to ensure lower-skilled students have high-quality teachers and the supports they need to remain enrolled, engaged, and graduate will be a major factor in whether competency-based reforms can reach scale. We will explore competency education's implications for equity in far more detail in a forthcoming companion paper, as described in the next section.

» Meeting the persistent challenge to ensure lower-skilled students have high-quality teachers and the supports they need to remain enrolled, engaged, and graduate will be a major factor in whether competency-based reforms can reach scale.

CONCLUDING THOUGHTS

In this report, we described the landscape of modern-age competency education movement and traced its roots in progressive education, mastery learning, and the standards movement in order to better understand the positive outcomes of past approaches, their critiques, and the challenges they faced. We coupled this historical analysis with recent research on learning science and theory, including motivation, agency, and assessment, to make a case for a personalized form of competency education approaches. Finally, we laid out some of the major policy, political, and implementation opportunities and challenges competency-based reformers must leverage and grapple with if the work is to reach any sustaining scale.

Answering many of the questions raised in this paper requires careful analysis. Clear data on outcomes are just beginning to emerge. Several studies are currently underway, thanks to efforts of the Regional Education Labs (especially the REL Northeast College and Career Readiness Research Alliance, REL Midwest, and REL Central and the Marzano Research Laboratory), the American Institutes for Research (funded by the Nellie Mae Education Foundation), and RAND (funded by the Gates Foundation). Yet even these ambitious efforts are struggling to provide the field the answers it needs, due to the vast diversity in implementation and definition across the many models that claim to be competency based. In an effort to ground the field in an area we believe is of utmost importance, Students at the Center will release a companion paper later this year covering what is already known about competency education's implications for equity. This piece will explore equity and outcomes through analyzing previous research and data-based efforts that help address key questions

about the impact of competency education on vulnerable and underserved populations.

Before we attempt to scale personalized competency education from a few promising examples to a transformation of the nation's high schools, much more must be known about the issues highlighted here. Fortunately, the growing number of competency-based schools and programs are beginning to yield some answers and insights. The lessons we are able to derive from the historical and theoretical grounding leave us hopeful for the promise of competency education—a personalized system that ensures each and every learner leaves secondary school ready to succeed in college, career, and civic life. At the same time, these lessons present challenges that have yet to be fully addressed, and today's context offers new questions to answer. As the frontline innovators continue to improve and make their models more personalized and rigorous, we look forward to being part of building the knowledge base that informs this movement.



The lessons we are able to derive from the historical and theoretical grounding leave us hopeful for the promise of competency education—a personalized system that ensures each and every learner leaves secondary school ready to succeed in college, career, and civic life.

ENDNOTES

¹ In 1890, a paltry 200,000 students attended high school; by 1920, enrollments were *10 times* that number (Church & Sedlak 1976). In 1900, only about 6 percent of American adolescents completed the 12th grade; by 1939, more than 50 percent did so (census data).

² These approaches may also be called competency-based, proficiency-based, mastery-based, or performance-based education: <http://edglossary.org/competency-based-learning>

³ The seat-time method of awarding credit is also known as the Carnegie Unit. For a thorough investigation of the development of the Carnegie Unit and the impact on current secondary and postsecondary education structures, see Silva & White (forthcoming).

⁴ See the CompetencyWorks wiki page “Examples of Competency-Based Schools and Districts”: <http://competencyworks.pbworks.com/w/page/67552887/Examples%20of%20Competency-based%20Schools%20and%20Districts>

⁵ The Hewlett Foundation joined the Nellie Mae Education Foundation as an equal partner supporting Students at the Center in 2014, helping expand the research and knowledge building focus to include concepts of deeper learning.

⁶ For a more detailed investigation of evolving terms in the blended learning arena, see: Patrick, S., Kennedy, K., & Powell, A. 2013. *Mean What You Say: Defining and Integrating Personalized, Blended and Competency Education*. Vienna, VA: iNACOL. Available at <http://www.inacol.org/cms/wp-content/uploads/2013/10/iNACOL-Mean-What-You-Say-October-2013.pdf>

⁶ See the CompetencyWorks wiki page “Examples of Competency-Based Schools and Districts” for case studies, videos, school models and more additional links: <http://competencyworks.pbworks.com/w/page/67552887/Examples%20of%20Competency-based%20Schools%20and%20Districts>

⁷ See McClaskey, K. & Bray, B. 2013. “Personalization v. Differentiation v. Individualization Chart.” Amherst, NH: Personalize Learning, LLC. Available at: <http://www.personalizelearning.com/2013/03/new-personalization-vs-differentiation.html>

⁸ With the recent withdrawal of several states from the testing consortia, the final number of states to participate in the Common Core remains in question. Nevertheless, the debates have resulted in a renewed interest in close to all 50 states in defining high-quality learning standards and outcomes for students.

⁹ Unless otherwise noted, the research discussed in this section comes from the chapter “Applying the Science of How We Learn” by Christina Hinton, Kurt W. Fischer, & Catherine Glennon in *Anytime, Anywhere: Student-Centered Learning for Schools and Teachers* (Wolfe, Steinberg, & Hoffman, eds. 2013) and the authors’ paper *Mind, Brain, and Education: The Student at the Center Series* (2012). Both are based on extensive literature reviews.

¹⁰ Unless otherwise noted, the research discussed in this section comes from the chapter “Prioritizing Motivation and Engagement” by Eric Toshalis & Michael J. Nakkula in *Anytime, Anywhere: Student-Centered Learning for Schools and Teachers* (Wolfe, Steinberg, & Hoffman, eds. 2013) and the authors’ paper *Motivation, Engagement, and Student Voice: The Student at the Center Series* (2012). Both are based on extensive literature reviews.

¹¹ Unless otherwise noted, the research discussed in this section comes from the chapter “Making Assessment Student Centered” by Heidi Andrade, Kristen Huff, & Georgia Brooke in *Anytime, Anywhere: Student-Centered Learning for Schools and Teachers* (Wolfe, Steinberg, & Hoffman, eds. 2013) and the authors’ paper *Assessing Learning: The Student at the Center Series* (2012). Both are based on extensive literature reviews.

¹² For a detailed exploration of policy consideration for competency education, particularly at the federal level, see: http://www.competencyworks.org/wp-content/uploads/2014/01/CompetencyWorks_A_K-12_Federal_Policy_Framework_for_Competency_Education_February_2014.pdf. For policy considerations at the state level, see: <http://www.achieve.org/files/AchieveCBPTheImperativeforStateLeadership.pdf>

¹³ Even if a state decides not to implement the Common Core, almost all 50 states are defining a set of higher-quality, more rigorous college- and career-ready standards. So the idea holds that the Common Core debates have changed the political conversation to near-universal agreement for fewer and better standards, which in turn have the potential to align with competency-based efforts.

¹⁴ The last time states attempted to develop performance assessments was in the 1990s. David Conley's forthcoming investigation of assessment for deeper learning provides a detailed look at the promise and the challenges of large-scale performance assessment systems.

¹⁵ See Conley (2014) for an overview of current efforts to design and implement such assessments.

¹⁶ Such networks include: Achieve, Council of Chief State School Officers/Innovation Lab Network, Carnegie Corporation of New York/Springpoint, Digital Promise, Diploma Plus, Great Schools Partnership, Re-Inventing Schools Coalition

¹⁷ The research community has noted the absence of information on performance assessments for competency education. Researchers across the country engaged in studies of competency education discussed the absence on a REL-NEI conference call on July 15, 2014. Further evidence includes this presentation by the National Governor's Association (slide 19: <http://www.studentsatthecenter.org/sites/scl.dl-dev.com/files/DistrictStateConsiderationsIncorporatingExpandedLearningCompetency-BasedSystems.pptx>), July 29, 2014. Some of the studies emerging from the efforts in Maine explore how their districts addressed some of these questions. However, the authors are not aware of anything at the level of cost modeling or a comparison analysis underway. For example: <https://usm.maine.edu/sites/default/files/cepare/PBDS%20Report.pdf>

¹⁸ In 2015, Students at the Center will be releasing draft competencies for educators in student-centered settings, including personalized competency education settings.

¹⁹ See the CompetencyWorks wiki page "Examples of Competency-Based Schools and Districts" for case studies, videos, school models and more additional links: <http://competencyworks.pbworks.com/w/page/67552887/Examples%20of%20Competency-based%20Schools%20and%20Districts>

²⁰ See, for example: Blended Learning: Research Perspectives, Volume 2 from the Christensen Institute: <http://www.christenseninstitute.org/publications/blended-learning-research-perspectives-volume-2>

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TEL 617.728.4446 FAX 617.728.4857 info@jff.org

88 Broad Street, 8th Floor, Boston, MA 02110

122 C Street, NW, Suite 650, Washington, DC 20001

WWW.JFF.ORG

