THE CARNEGIE UNIT

A CENTURY-OLD STANDARD IN A CHANGING EDUCATION LANDSCAPE

BY ELENA SILVA, TAYLOR WHITE, AND THOMAS TOCH

Carnegie Foundation
for the Advancement of Teaching

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FOREWORD

EARLY IN THE TWENTIETH CENTURY, the industrialist Andrew Carnegie established the Carnegie Foundation for the Advancement of Teaching to create a pension system for the nation's college professors. The introduction of this pension system proved an ingenious educational reform. At the time, American higher education was a largely ill-defined enterprise with the differences between high school and colleges often unclear. To qualify for participation in the Carnegie pension system, higher education institutions were required to adopt a set of basic standards around courses of instruction, facilities, staffing, and admissions criteria. The Carnegie Unit, also known as the credit hour, became the basic unit of measurement both for determining students' readiness for college and their progress through an acceptable program of study. Over time, the Carnegie Unit became the building block of modern American education, serving as the foundation for everything from daily school schedules to graduation requirements, faculty workloads, and eligibility for federal financial aid.

Today, the Carnegie Unit is under intensifying critique from educators and education policymakers who want to make student performance more transparent and the delivery of education more flexible. They see the Carnegie Unit as a significant impediment to the changes they seek. They advocate for innovations that support transparency and flexibility, including competency-based education models.

In an effort to inform these reform conversations and serve as a constructive catalyst for change, the Carnegie Foundation launched a study to revisit the role, function, and uses of the Carnegie Unit. We explored in detail the nature of the problems that reformers aim to address and the complexity of the systems in which these problems are embedded. We analyzed what a shift away from the Carnegie Unit toward a competency-based (rather than an instructional time-based) metric might entail for the operation of our educational institutions and the students they serve. Finally, we considered the scope of innovations necessary to replace the Carnegie Unit, the ambitiousness and uncertainties associated with these tasks, and the vast array of practical problems that would need to be solved. We are pleased to present our findings and recommendations in this report.

Throughout its history, the Carnegie Foundation has played a progressive role in advancing educational opportunities in our society. We are committed to the goals of creating more effective and efficient educational systems that afford more engaging learning opportunities for all students. And we believe that increased flexibility in the delivery of education and greater transparency surrounding results are potentially important means to those ends. But we also know that a great deal of design, development, and continuous improvement efforts will be needed in order to transform these compelling ideas into actual operating systems that reliably produce quality outcomes at scale for all students. Put simply, it is not enough just to have good reform ideas. Educators as a community must learn their way into executing those ideas well. This often means starting small, learning from

our failures, and constantly using data to chart progress and inform efforts at continuous improvement. The Carnegie Foundation has been pioneering new ways to better tackle such "learning to improve" problems by bringing institutions together in networked improvement communities. These communities are specifically designed to bring analytic and empirical rigor to bear as educators create and test solutions to pressing problems. We believe these new methods and norms for practical problem solving have great applicability to the reform efforts described in this report, and we stand ready to work with the leaders of those efforts toward advancing the valued ends they now seek.

We wish to acknowledge the generous support of the William and Flora Hewlett Foundation, which allowed us to conduct this study. We benefitted tremendously from the insights and recommendations of the members of a national advisory board, listed in an appendix to the report. In addition, Carnegie's Board of Trustees reviewed several drafts of the report and their thoughtful contributions greatly improved the final product. While we are very grateful for these contributions, we reserve for ourselves responsibility for errors or omissions.

Anthony Bryk, President
Carnegie Foundation for the Advancement of Teaching

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EXECUTIVE SUMMARY

MOTIVATED BY A DESIRE to promote deeper learning among a wider range of students, educators and education policymakers have sought substantial changes in American education. They have sought to make student performance more transparent in order to strengthen the quality of instruction, and to increase schools' and colleges' accountability for students' learning. And they have pursued more flexible educational designs to respond to the varying learning needs of increasingly diverse student populations and to make education more accessible and affordable for all students.

Reformers have argued that reliance on the Carnegie Unit as a measure of student progress toward diplomas and degrees has in fact slowed progress toward those goals. By stressing the amount of time students spend in the classroom rather than their mastery of subjects, the Carnegie Unit discourages educators from examining more closely students' strengths and weaknesses. It masks the quality of student learning. And by promoting standardized instructional systems based on consistent amounts of student-teacher contact, it discourages more flexible educational designs.

The Carnegie Foundation is committed to making American education more effective, more equitable, and more efficient at this critical junction in the nation's history. We share change advocates' goals of bringing greater transparency and flexibility to the design and delivery of K-12 and higher education in pursuit of deeper learning for more students. After studying the Carnegie Unit's relationship to today's reforms, we have concluded that American education's reliance on the Carnegie Unit is an impediment to some of the solutions sought by reformers. Most notably, the federal government's financial aid rules requiring colleges and universities to measure student progress using Carnegie Units are a barrier to the spread of flexible delivery models in higher education.

We also recognize, however, that the Carnegie Unit plays a vital administrative function in education, organizing the work of students and faculty in a vast array of schools and colleges. It provides a common currency that makes possible innumerable exchanges and interconnections among institutions. And it continues to provide a valuable opportunity-to-learn standard for students in both higher education and K-12 education, where inequitable resources and variable quality are more the rule than the exception.

The Carnegie Foundation established the Carnegie Unit over a century ago as a rough gauge of student readiness for college-level academics. It sought to standardize students' exposure to subject material by ensuring they received consistent amounts of instructional time. It was never intended to function as a measure of what students learned. Teachers and professors were left to gauge students' actual learning through grades and tests, papers, and other performance measures. Many current indictments of the Carnegie Unit as a poor proxy for the quality of student learning ignore this important distinction.

Today's pursuit of greater transparency and more flexible educational designs represents a substantial challenge to our educational institutions and those who work in them. Making American education significantly more transparent and flexible would necessitate widely shared standards and common measures of student performance—both daunting tasks, especially in higher education where an array of institutions serve students with widely varying interests. It would also present the formidable challenge of securing broad-based political and professional endorsement of both the standards and new assessments.

Moreover, our research suggests that the Carnegie Unit is less of an obstacle to change than it might seem. While the Carnegie Unit's time-based standard certainly had a substantial impact on the design and delivery of American education, educational institutions—especially in higher education—already have considerable flexibility in the format and delivery of instruction.

Many promising improvement initiatives are already underway. The foundation strongly endorses this activity. But the work must be accompanied by rigorous efforts to gather evidence and learn from these experiments as they evolve. American education has a long history of promising reform ideas that have failed to achieve their intended outcomes. It is one thing to have good ideas for change; it is another to execute effectively and efficiently in our large, complex educational systems.

So as we embrace innovation, we must also be critical realists—change often fails to yield improvement and sometimes can even bring harm. Achieving reform requires not just advocacy, but sustained, systematic efforts to study innovations and learn from them in a spirit of continuous improvement, both as they begin and as they grow. We need to accumulate evidence that new educational models aiming for greater flexibility and transparency actually enhance educational opportunities and moderate costs, under what conditions, and for which students—ensuring that we safeguard students along the way. This is the sustained work required to transform today's promising ideas into tomorrow's powerful outcomes.

IN 1905, RETIRED STEEL MAGNATE ANDREW CARNEGIE, then the world's richest man, wrote a letter to college presidents declaring his intention to establish a pension system for "one of the poorest paid but highest professions in our nation"—college professors.[1] He created the Carnegie Foundation for the Advancement of Teaching to run the system and sent a ten million dollar check to the Foundation's trustees, led by Harvard President Charles Eliot, to finance it.[2]

But the task wasn't simple. American higher education in the early twentieth century was a still nascent and largely ill-defined enterprise serving less than 1 percent of the nation's students.[3] The system was so new that differences between high school and colleges weren't always clear. "The term college is used to designate . . . institutions varying so widely in entrance requirements, standards of instruction, and facilities for work, that for the purposes of this foundation, it is necessary to use, at least for the present, some arbitrary definition of that term," Carnegie officials wrote in *Science* in 1906.[4] Many colleges demanded little more than elementary levels of geography, arithmetic, grammar, reading, and spelling of their applicants. Iowa State College, for example, required only that students be fourteen years old, able to read and write English, and able to pass an arithmetic test.[5]

To determine which institutions were eligible to take part in the Carnegie pension system, the Foundation had to define what a college was.

Adding to the challenge was the reality that Carnegie's ten million dollar grant, while substantial for the day, wasn't enough to cover the faculty at every institution calling itself a college or university.[6] So Eliot and his colleagues had to narrow the number of qualifying campuses. "To be ranked as a college," and thus be eligible to participate in the Carnegie pension plan, an institution "must have at least six professors giving their entire time to college and university work, a course of four full years in liberal arts and sciences, and should require for admission, not less than the usual four years of academic or high school preparation, or its equivalent."[7]

"High school preparation" meant many different things in an era when secondary education was mostly limited to the elite. (The national graduation rate hadn't reached 10 percent.)[8] The Carnegie trustees, as a result, wanted to provide guidance to schools and colleges. They turned to the New York State Board of Regents, which had established high school graduation standards

based on blocks of instruction called "counts"— ten weeks of study, five days a week. Carnegie's leaders also consulted the newly formed College Entrance Examination Board, which had begun producing course outlines and college admission tests in subjects ranging from Latin to physics. And they tapped into the work of the National Education Association's Committee of Ten, a panel of prominent educators led by Charles Eliot that had called for a standardized high school curriculum comprised of four years of English and a foreign language, and three years of history, science, and mathematics that would be taught "consecutively and thoroughly" to all students.[9]

The Carnegie trustees concluded that college entrance requirements should be "designated in terms of units, a unit being a course of five periods weekly throughout an academic year of the preparatory school." Fourteen such units constituted "the minimum amount of preparation" for students heading for college.[10] And colleges that required fourteen units for admission would, if they met the Foundation's other requirements, qualify for the pension fund.

Ultimately, Andrew Carnegie's largesse wouldn't be enough to sustain the pension program, and in 1914 the Foundation spun it off into an independent non-profit organization, known today as TIAA-CREF.

But the Carnegie Unit, as it came to be called, became deeply rooted in the American educational landscape.

Colleges and universities quickly crafted new admission requirements to conform to the demands of the Carnegie pension program, causing the nation's rapidly expanding high school system to introduce new diploma requirements to ensure that students amassed the required fourteen course credits on their way to graduation—each credit representing some 120 hours of instruction over a school year.

What's more, many in education, including Carnegie's leaders, didn't see the Carnegie Unit merely as a pathway to pensions, but as a broader mechanism to improve the administrative efficiency of schools and colleges in the spirit of the "scientific management" movement of the day.

Studies of universities highlighted a host of operational inefficiencies and a general lack of standardization. The Carnegie Foundation itself underwrote a study by industrial engineer Morris Cooke titled "Academic and Industrial Efficiency."

The Carnegie Unit and the Credit Hour

The standard Carnegie Unit is defined as 120 hours of contact time with an instructor, which translates into one hour of instruction on a particular subject per day, five days a week, for twenty-four weeks annually. Most public high schools award credit based on this 120-hour standard (one credit for a course that lasts all year; or half a credit for a semester course). And, while state and district coursework requirements for graduation vary, most states require a minimum number of units, typically expressed as "Carnegie Units." A typical high school student earns six to seven credits per year over a four-year program of high school.

In higher education, students receive "credit hours," a metric derived from the Carnegie Unit and based on the number of "contact hours" students spend in class per week in a given semester. A typical three-credit course, for example, meets for three hours per week over a fifteen-week semester. A student, then, might earn fifteen credit hours per semester (fifteen is standard full-time registration for a semester, thirty for an academic year) en route to a four-year bachelor's degree requiring a total of 120 credits.

Lecture halls sat empty for hours on end in many institutions, Cooke reported. And course enrollments were measured in widely varying ways, making it difficult to calculate faculty workloads and operating costs with any confidence.

Higher education, Cooke concluded, needed a common metric. He recommended "the most immediately available unit"—Carnegie's recently created "student hour" that represented "an hour of lecture, of lab work, or of recitation room work, for a single pupil," with the standard college course comprising three such hours of weekly contact between students and professors over three-and-a-half-months-long semesters. "With this as a basis," Cooke wrote, "we can get some tally on the efficiency with which the buildings are operated, the cost of undergraduate teaching, and other items which go to make up the expenses of a university."[11] [See The Carnegie Unit and the Credit Hour, Page 8]

A COMMON CURRENCY

Before long, the Carnegie Unit became the central organizing feature of the American educational enterprise, a common currency enabling countless academic transactions among students, faculty, and administrators at myriad public, non-profit, private, and for-profit institutions, as well as between education policy makers at every level of government.[12] It helped to structure an undeveloped system that would become the envy of the world. Everything from faculty workloads and compensation to athletic eligibility, academic calendars, course sequences, degree programs, daily school schedules, instructional strategies, institutional accountability, and accreditation, as well as eligibility for billions of dollars of federal financial aid, would come to rely on the Carnegie Unit. This greatly simplified the work of educators, registrars, bursars, institutional planners, and many

others who would otherwise be forced to rely on much more cumbersome methods of quantifying the value of students' courses.

The Carnegie Unit's expediency supported the rapid expansion of secondary and post-secondary education in the United States during the nineteenth and twentieth centuries. Spurred by a growing national population, child labor prohibitions, civil rights laws, and such federal higher education initiatives as the Morrill Acts, the G.I. Bill, and the dramatic expansion of financial aid under the Higher Education Act of 1964, enrollment swelled in both secondary and post-secondary schools.[13] The Carnegie Unit provided a shared metric for the many new institutions and new types of institutions emerging on the education landscape—a readily recognizable building block that permitted American education to grow faster and more efficiently than would have been possible otherwise. In no small part, it was the Carnegie Unit's simplicity that enabled a wide range of higher education institutions to flourish.

No less importantly, the Carnegie Unit has, since its inception, helped to ensure that the vast majority of the nation's students, regardless of their backgrounds or the institutions they attend, receive the same number of instructional hours in high school and college courses—supplying an often-undervalued component of equal educational opportunity in American education.

QUESTIONING THE CARNEGIE UNIT'S MERITS

Today the Carnegie Unit is under intensifying scrutiny. Motivated by a desire to promote deeper learning among a wider range of students, policymakers, philanthropic organizations, and educators themselves are pressing for new educational models that are, as Education Secretary Arne Duncan has described, "defined by learning

outcomes, not 'seat-time' requirements."[14] Buoyed by new insights into student learning, advances in technology, and, especially in higher education, escalating costs, these new models aim to make the nation's secondary and post-secondary education systems more effective, more equitable, and more efficient.

Reformers are pursuing two major strategies to achieve those goals. They are seeking to make student performance more transparent, in the hopes of strengthening the quality of instruction and increasing schools' and colleges' accountability for student learning. And they are promoting more flexible educational pathways to respond to the varying learning needs of increasingly diverse student populations and to make education more accessible and affordable for all students.

Many change advocates charge that the Carnegie Unit has slowed the pace of these reforms. They argue that by stressing students' exposure to academic disciplines rather than their mastery of them, the Carnegie Unit discourages educators from examining closely students' strengths and weaknesses and masks the quality of student learning. And by promoting standardized instructional systems based on consistent amounts of student-teacher contact, it discourages more flexible educational designs.

Such criticisms aren't new, but rather reflect long-standing dilemmas about how best to organize complex educational systems. "[N]one recognizes more clearly than the Foundation that these standards have served their purpose," Carnegie Foundation President Henry Suzzallo wrote of the Carnegie Unit in the Foundation's 1934 annual report. "They should give place to more flexible, more individual, more exact and revealing standards of performance as rapidly as these may be achieved."[15] In the 1960s and 1970s, the Foundation's Carnegie Commission on Higher Education urged institutions to shorten the length of degree programs, offer more flexible routes to degrees, and grant credit for training and experience outside of formal institutions. As recently as 2003, former Carnegie Senior Scholar Thomas Ehrlich, serving as co-editor of the book *How the Student Credit Hour Shapes Higher Education*, warned that the Carnegie Unit may be "perpetuating bad habits that get in the way of institutional change in higher education."[16]

But developing the necessary infrastructure to accomplish such change and securing the broad-based political and professional endorsements to bring it to scale have proven difficult. As a result, many of the innovations that have taken place over the years remained largely on the margin of our educational systems. In an effort to help inform today's reform conversations, this report analyzes the Carnegie Unit's role in American education. It examines reformers' calls for greater transparency and flexibility and analyzes their assessments of the Carnegie Unit as a potential impediment to innovation. And it examines what a shift away from the Carnegie Unit would mean for the American educational system as a whole.

The Carnegie Foundation is committed to making American education more effective, more equitable, and more efficient at this critical junction in the nation's history. Like President Suzzallo eight decades earlier, the Foundation supports instruction tailored to students' individual needs in pursuit of deeper learning and greater transparency on student performance; where the Carnegie Unit is a barrier to such improvements,

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it should be moved aside. We have concluded that American education's reliance on the Carnegie Unit is indeed an impediment to some of the solutions sought by today's reformers. Most notably, the federal government's requirement that students must spend federal financial aid at colleges and universities measuring student progress with the Carnegie Unit is a barrier to the spread of flexible delivery models in higher education.

But the Carnegie Unit also continues to play a vital administrative function in education, organizing the work of students and faculty in a vast array of schools and colleges. It provides a common currency that makes possible innumerable exchanges and interconnections among institutions. And it continues to provide a valuable opportunity-to-learn standard for students in both higher education and K-12 education, where inequitable resources and variable quality are more the rule than the exception.

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TRANSPARENCY

THE CASE FOR TRANSPARENCY

Reformers are seeking greater transparency in American education to strengthen instruction and to increase school and college accountability in the face of rising tuitions and troubling evidence that many students are earning course credits without acquiring much knowledge. A 2006 longitudinal study of 2,200 students at seventeen four-year colleges and universities found that, on average, students increased only a small amount or even declined on a range of outcome measures, including academic motivation, critical thinking and contribution to science.[17] As further evidence, reformers point to the fact that sixty percent of the nation's community college students (who comprise nearly half the country's college enrollments) are required to take remedial math courses at college, even though they have taken the requisite number of math courses for high school graduation.[18]

The demand for clearer outcomes is so great that the US Department of Education recently proposed to rate the nation's colleges on results, a move that would have been unthinkable a generation ago. Institutional performance measures that go well beyond the measures of admissions selectivity, faculty qualifications, financial resources, and other input characteristics that dominate commercial rankings like those of *U.S. News & World Report,* are necessary, the Obama administration contends, to push colleges and universities to ensure that their undergraduates are learning, particularly those students in less selective colleges and universities who comprise the majority of the nation's higher education enrollments.

Leaders on both sides of the political aisle have been part of the transparency campaign. In 2005, Margaret Spellings, then Secretary of Education under George W. Bush, created the Commission on the Future of Higher Education that called for all higher education institutions to collect individual student performance information and report "meaningful student learning outcomes."[19] The Obama administration's plan picks up on the Commission's proposal. It would rate colleges and universities on metrics including graduation and transfer rates, advanced degrees earned by graduates, and graduates earning, and it would link institutions' eligibility for the federal student aid program to their results.

At the same time, the nation's accrediting agencies are under pressure to ratchet up accountability in higher education. The nation's seven major regional accrediting agencies have traditionally judged schools and colleges through a peer-review process that tends to prioritize educational opportunities over student results.[20] The evaluation teams they recruit from other campuses are tasked with responsibilities such as ensuring there are enough faculty and student support services, that facilities are adequate, and that their curriculum has sufficient scope. Increasingly, reformers

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are pressing them to include a wider range of student outcomes in their evaluations.[21] The Senior College and University Commission of the Western Association of Schools and Colleges (WASC), for example, recently began requiring higher education institutions to report retention and graduation rates for all of its students, including part-time and transfer students.[22] Many would have WASC—and the Obama administration in its ratings initiative—go further, identifying what students actually know and how much they have grown at a given institution.

In public elementary and secondary education, where costs are borne by taxpayers and student enrollment is mandatory, public reporting of standardized testing results has been commonplace for two decades. Now, there's mounting pressure to deploy assessments of student progress that gauge the deeper learning reflected in the new Common Core State Standards, and not merely the mostly basic skills measured in many standardized tests today. "Our current standardized tests focus on recall of facts and procedures, the lowest levels of learning," says James Pellegrino, a testing expert who co-directs the Learning Sciences Research Institute at the University of Illinois at Chicago. "They're easily scored and quantified for accountability procedures, but not optimal in measuring the kinds of competencies that represent deeper learning."[23]

Reformers are also looking to the potential of technology to provide a clearer picture of learning. New information platforms permit educators to more precisely and quickly identify individual student strengths and weaknesses, modify instruction to students' specific needs, and report with greater precision what students know, where they struggle, and how best to help them. Reformers point to online "adaptive learning organizations" like Khan Academy and Knewton that let students move at their own pace, get personalized remediation, practice as much as they need, and move ahead once their scores demonstrate they have mastered a skill.[24] The Open Learning Initiative (OLI), begun at Carnegie Mellon University and now at Stanford University, provides on-demand, targeted feedback to college students via "cognitive tutors" (computer-based hints and examples that pop up when the student is struggling). Student results are shared with instructors, OLI course developers, and learning science researchers working to continuously improve OLI courses and instruction more generally.[25]

The Carnegie Unit, critics say, impedes the push for greater transparency by making instructional time the principal institutional marker of

Transparency in Student Records

Stanford University has launched a project to increase transparency on student learning while continuing to use traditional Carnegie Unit-based transcripts. The university is pilot testing "scholarship records," digital documents designed to supplement traditional transcripts by describing which of the university's eleven learning standards students can be assumed to have mastered when they complete a course. These standards, what Stanford calls "breadth requirements," range from "applied quantitative reasoning" to "social inquiry." According to Stanford Registrar Tom Black, the new records are part of a larger effort, including the use of electronic learning portfolios, to help students understand more about their learning and share this with other institutions and employers upon graduation.

student progress toward diplomas and degrees. They suggest that relying on the Carnegie Unit to measure student progress—prioritizing the time that students spend in courses—has caused policymakers and education practitioners to pay insufficient attention to what students are actually learning, or not learning. They contend that relying on the Carnegie Unit encourages a "credit chase" among students, an attempt to amass course credits as quickly and easily as possible in systems where time appears to matter more than learning. "College degrees," writes Amy Laitinen, deputy director of higher education at the New America Foundation, "are still largely awarded based on 'time served,' rather than learning achieved."[26] Laitinen and others point to the fact that colleges and universities routinely reject transfer students' credits—regardless of the grades they earned in the courses—as evidence that institutions themselves view the Carnegie Unit as a poor proxy for learning.[27]

THE TRANSPARENCY AGENDA AND THE CARNEGIE UNIT

A more complete picture of student learning would surely benefit students, families, and taxpayers. And relying on the accumulation of Carnegie Units as a proxy for student achievement, as many in American education have done, may play a role in obscuring students' true performance. But the Carnegie Unit has been miscast as a measure of learning. University of Miami Professor Sidney Besvinick was right when he wrote five decades ago in the education magazine *Phi Delta Kappan* that the Carnegie Unit was "essentially a year-long

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record of quantitative exposure to a given discipline and reflected nothing of quality."[28]

The primary source of the transparency problem in American education is a lack of measures that accurately convey learning and substantiate the value of credits. The reality, of course, is that both content and rigor vary widely from class to class and institution to institution in what are ostensibly the same courses. The grades that students earn often mask as much as they reveal, misleading students about their accomplishments and depriving educators and institutions of information they could use to strengthen their instruction and programs. "How clearly or objectively does a C-minus in geometry or a B-plus in English Literature describe the extent of any one individual's understanding of a complex content domain?" asks Camille Farrington, a research associate at the Consortium for Chicago School Research. "Grades," Farrington asserts, "simply reflect the student's course performance relative to the teacher's expectations, which can be vague and unspecified."[29]

Exposing the widely varying standards that lie beneath course grades—and encouraging educational institutions and public officials to improve the quality of the education that students receive—would require standards that clearly define rigorous expectations and serve as the basis for equally demanding assessments that reveal students' actual learning.

Efforts to define common learning standards and assessments are underway in both K-12 and higher education from the national to the faculty

levels, unimpeded by the Carnegie Unit. But these efforts have proved challenging, particularly in higher education.

The Standards Gap

The most prominent attempt to establish rigorous standards on a large scale is the development in recent years of the Common Core State Standards in elementary and secondary education under the auspices of the National Governors Association and the Council of Chief State School Officers. Despite fierce debates over the wisdom of national education standards, forty-three states, the District of Columbia, four territories, and the Department of Defense Education Activity (DoDEA) are implementing variations of the voluntary reading and math standards.

Reformers are also pushing for shared learning standards in higher education. The Indianapolis-based Lumina Foundation is funding a national initiative known as the Degree Qualifications Profile (DQP) to define the skills and knowledge students should possess at the associate's, bachelor's, and master's degree levels, regardless of the subjects they study.[30] The DQP, says Carol Geary Schneider, president of the Association of American Colleges and Universities and a DQP co-author, is an attempt "to define, in common terms, the high-level skills that students need," and to get "beyond fragmented learning, where too many students experience disconnected or incoherent pathways to completion."[31]

Faculty is also at the heart of a related effort to create shared expectations at the discipline and

Standards and Outcomes

The terms "standards" and "outcomes" are often used interchangeably in K-12 and higher education, but they are distinct concepts.

Standards describe what students *should* know and be able to do as a result of their education. They are akin to goals or objectives in that they express expectations for learning. Outcomes, on the other hand, express results, describing what students *actually* know and can do at the end of a class, course, or program. In an ideal world, student outcomes would match the set standards.

In K-12 education, state officials define learning standards, which are typically descriptions of what students should be able to know and do in core academic areas by grade level. The Common Core State Standards represent an effort to establish national learning standards.[i]

Efforts to create common expectations for student learning across higher education institutions have met strong resistance. Nonetheless, at least a few major initiatives to define higher education learning standards are gaining favor, including the Lumina Foundation's Degree Qualifications Profile and the Liberal Education and America's Promise (LEAP) campaign of the Association of American Colleges and Universities.[ii] Though sometimes referred to as "learning outcomes," these higher education initiatives are, in fact, efforts to introduce standards, since they attempt to define the expectations for what a student should know and be able to do (often by degree level and/or discipline area), rather than capture what students *actually* know and can do by the end of their program of study.

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[i] Here's an example from Common Core State Standards, English 9 Writing: "Write informative texts to examine a topic and convey ideas, concepts, and information through the selection, organization, and analysis of relevant content."

[ii] The Association of American Colleges and Universities has developed a set of "Essential Learning Outcomes" which functions as a set of core standards for college students. See https://www.aacu.org/sites/default/files/files/LEAP/EssentialOutcomes_Chart.pdf.

program levels. Called "tuning," the faculty-led process creates common frameworks for learning in specific disciplines and degree programs. "We need some way to say at a certain point [that] a student has competency in his field and here's how we know it," says Norm Jones, a history professor at Utah State University who is leading his department's tuning process. "[But] we don't want standards built by someone else and imposed upon us, with their rules and their language."[32]

Establishing shared standards is far from a simple task, especially in higher education where the curriculum is highly specialized and diverse and faculty autonomy is deeply ingrained. The international Assessment of Higher Education Learning Outcomes program, led by the Organisation for Economic Co-operation and Development, sought to measure learning outcomes across seventeen national higher education systems in three fields: economics, engineering, and generic skills. Since launching in 2008, the project has been slowed by funding constraints, language and cultural differences, and the widely varying missions and student populations of the participating institutions.[33]

The Voluntary Institutional Metrics Project, a Gates Foundation-funded initiative to establish shared student performance standards among colleges and universities in the US, faced the same challenge. Although the project's eighteen institutions were willing to collect common information on general metrics like student loan default rates, student completion rates, and employment data, they were unable to agree upon shared, discipline-specific expectations for what students should know and be able to do. Given the diverse missions and student populations of the colleges and universities in the project—and beyond—the institutions in the project emphasized the importance of setting learning standards individually.[34]

Academic programs with strong occupational orientations and standards set by professional organizations often show less resistance to common standards in higher education. For example, Albany, NY-based Excelsior College, the nation's largest provider of nursing degrees, has created its nursing program in close collaboration with the nursing profession and employers. To earn their degrees, Excelsior's nursing students must pass the National Council Licensure Examination for Registered Nurses administered by the National Council of State Boards of Nursing and complete a three-day performance assessment in hospitals. Making student performance more transparent throughout higher education—and thereby reducing reliance on individual instructors' grades—will require comparable standards in liberal arts disciplines, where consensus is considerably harder to achieve.

> Efforts to define common learning standards are under way in both K-12 and higher education from the national to the faculty levels—unimpeded by the Carnegie Unit. These efforts have proved challenging, particularly in higher education.

The Need for Learning Measures

A number of new assessment approaches that provide detailed and individualized information about student learning are under development today, and they suggest the magnitude of the effort required to create a fully transparent educational system. Establishing common assessments is a somewhat simpler task in K-12 education, which already employs statewide standardized tests. Two state testing consortia known as Partnership for Assessment of Readiness for College and Careers (PARCC) and Smarter Balanced are developing

"next generation" assessments aligned with the K-12 Common Core standards.[35] Smarter Balanced promises a clearer picture of students' strengths and weaknesses by adapting computer-delivered test questions to students' individual ability levels, while both Smarter Balanced and PARCC hope to provide immediate feedback to students, parents, and teachers via computer-based scoring.

They are also being designed to measure a wider range of skills than many current state standardized tests, replacing the traditional fill-in-the-blank or multiple-choice questions with performance tasks that require students to solve complex problems (and show how they solved them). The Council of Chief State School Officers and other organizations are calling for new public school accountability systems built on these more sophisticated assessments with "a broader range of indicators that better capture the full construct of college, career and civic readiness."[36]

New ways of measuring and reporting what students are learning are also emerging at the local level. Maine's Regional School Unit 2 district, for example, is one of several in the state that has adopted a series of scales and rubrics that are more descriptive than the traditional A-F grading system. Rather than receiving a single letter grade for Algebra, students get scores for each of the steps and levels of Algebra, such as Interpreting Functions.

But many assessments that measure a wider range of student abilities and provide information that can help educators personalize instruction are more expensive to create and administer than today's standardized tests. It's unlikely, for example, that the PARCC and Smarter Balanced tests would have been developed, much less widely adopted,

The vastness of the American college and university system and the diversity of its objectives make the assessment challenge daunting.

if the Obama administration hadn't earmarked over $300 million for the work, which is currently producing tests in just two subjects, reading and mathematics. And tests that aim to measure more—often by stressing essays, projects, and other performance measures—have proven difficult to use reliably on a large scale. It is hard, for example, to score performance assessments consistently, though the International Baccalaureate and the essay portions of the Advanced Placement exams offer possible models.

In higher education, where there is no tradition of common testing beyond admissions assessments like the SAT and tests for professional licensure or some academic disciplines, efforts to build common measures of student learning are less widespread.

One of the few measures already in place is the Collegiate Learning Assessment, or CLA.[37] Administered by the nonprofit Council for Aid to Education, the ninety-minute online test measures students' analytical, problem-solving, and other higher-order thinking skills. The exam is administered to students in their first year of college and then again before graduation to gauge how much learning takes place over four years, and thus the value colleges have added. But a test of college students' generic abilities (some 600 of the nation's 4,700 higher education institutions administer the exam) can't be expected to fully capture student learning in myriad academic disciplines or to serve as the basis of instructional improvement in individual courses.

And because what's tested is what typically gets taught, common assessments in higher education run the risk of narrowing curricula, as happened in the wake of the federal No Child Left Behind Act testing requirements in elementary and secondary

Learning from Bologna

Like American higher education, many international higher education systems are attempting to make college credits and degrees more rigorous, portable, and affordable in an effort to promote higher standards, greater flexibility, and improved efficiency.

One example is Europe's Bologna Process. Underway for more than a decade in what is now known as the European Higher Education Area (EHEA), the program has sought to create common degree structures, define common learning outcomes, and develop a shared language for awarding and transferring credit among European colleges and universities. The EHEA serves nearly thirty-six million students across forty-seven participating European nations.

The EHEA has successfully established a shared degree system across national borders, a system already in place in the United States. More than 80 percent of participating EHEA institutions now report a common three-tiered bachelor's, master's, and doctor of philosophy structure.

But the EHEA has faced many of the same challenges that American reformers have confronted in establishing common standards and assessments in the United States. These include the uneven pace of adoption and implementation in various regions; the focus on employment and economic development at the expense of liberal learning outcomes; tension between the desires to increase degree completion at a reduced cost and improve the quality of learning; and the need to help struggling students meet higher standards. The EHEA also faced challenges in creating the European Qualifications Framework, which, long before the Degree Qualifications Profile in the US, sought to articulate core learning outcomes for each degree level (regardless of discipline) so baccalaureate, masters, and doctoral degrees would reflect roughly the same level of learning across countries.

The EHEA, like the US, has also struggled with having a common method of valuing and awarding credit. The European Credit Transfer System (ECTS) was initially designed to award credit based on a combination of grades, learning outcomes, and student workload (that is, how much student work would be required to meet the learning outcomes). However, as it became clear that grading practices were too difficult to standardize, and that using credit as an outcomes measure was impractical, the ECTS moved to awarding credit by workload alone. While "workload" is not a measure of faculty contact hours, it is fundamentally a time-based measure. According to the ECTS guidebook, workload "indicates the time students typically need to complete all learning activities (such as lectures, seminars, projects, practical work, self-study, and examinations) required to achieve the expected learning outcomes." The guidebook goes on to explain that, "in most cases, student workload ranges from 1,500 to 1,800 hours for an academic year, whereby one credit corresponds to 25 to 30 hours of work."[i]

It remains unclear if these hours are based on a careful analysis of the relationship between learning outcomes and workload, which is the intent of ECTS. It is just as likely, some critics contend, that faculty are treating workload just like the time-based credit hour. Higher education scholars Jane Wellman and Thomas Ehrlich, who conducted an influential study of the credit hour a decade ago, observed this early on. "The evidence from other countries helps to answer the question . . . If the credit hour did not exist, would we need to invent it? The answer seems to be yes."[ii]

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[i]   European Communities, "ECTS User's Guide."

[ii]   Wellman, "The Credit Hour."

education. The vastness of the American college and university system and the diversity of its objectives make the assessment challenge daunting. It's not surprising then that the Obama administration and other accountability advocates have focused on graduation rates, post-graduation employment, and other proxies for student learning in higher education. While perhaps bringing pressure to bear on colleges and universities to improve their programs, these measures don't provide the transparency on what students are learning in classrooms that reformers have sought, and thus don't offer information to respond to students' individual learning needs and improve instruction.

Perhaps the strongest evidence of the challenge in creating greater transparency in higher education comes from Europe, where institutions serving nearly thirty-six million students in forty-seven European nations have worked for over a decade to create common degree structures, define common learning outcomes, and develop a shared language for awarding and transferring credit across the region known as the European Higher Education Area. Yet these institutions have struggled to find a common method of valuing course credits and have settled on a simple, time-based metric that is not unlike the American credit hour. [See Learning from Bologna, Page 18]

FLEXIBILITY

THE FLEXIBILITY AGENDA

The critiques of the Carnegie Unit also extend to how schools and colleges are structured and instruction is delivered. Three substantial

> Institutions in the European Higher Education Area have struggled to find a common method of valuing course credits across institutions and have settled on a simple, time-based metric not unlike the American Carnegie Unit.

developments have caught reformers' attention in recent years: new insights into student learning, the increasing potential of technology to enhance education, and growing interest in "competency" models as a way to personalize learning and, especially for college students, target it more closely to employment opportunities. Driven by these developments, many educators have begun to pursue three strands of design and delivery flexibility in education: alternative school and college calendars, new strategies for pacing students through schools and colleges, and credit for learning acquired outside of traditional courses—all innovations reformers claim the Carnegie Unit impedes.

An expanding body of research from the interdisciplinary field of learning sciences suggests that students learn in different ways and at different paces. The deepest levels of student understanding, the research suggests, is best achieved when students have opportunities to connect and integrate knowledge across disciplines, acquire and apply information in the context of the real world, and learn in collaborative settings that rely not just on classroom teachers, but also on multiple sources of expertise.[38] Researchers have suggested that organizing schools and colleges in new ways to reflect these realities may enhance student learning, prompting growing numbers of educators in both K-12 and higher education to explore new, more flexible and more personalized educational strategies.[39]

Reformers are equally eager to explore the potential of technology to spur new designs that permit students to study virtually anything, anywhere, anytime—helping many students who

would otherwise struggle to attend school and college because of family commitments, conflicts with work, lack of transportation, and other challenges. Indeed, almost a third of all undergraduate students today take online classes.[40] Education laws in at least five states now require that high school students complete an online course before graduating.[41] Reformers suggest that technology also increases educators' ability to personalize instruction and has the potential to increase the efficiency of the educational enterprise in the face of sharply rising costs.[42]

A third catalyst of the campaign for new educational designs is the rising popularity of

Competency-Based Education

The term *"competency"* has grown increasingly popular in education in the past decade and is now commonly used in both K-12 and higher education to describe the skills and knowledge that lead to mastery of standards. Competencies describe not just the *acquisition* of skills and knowledge, but also their *application*. "We use competency as a benchmark in most areas of life except education," says Rose Colby, an expert on competency-based education. "My surgeon is competent when she not only knows the anatomy of my abdomen, but can also skillfully remove my appendix when needed. My accountant can add, subtract, multiply, and divide, but I am counting on his competency to use those skills when problem solving the data I give him to correctly calculate my taxes."[i]

But the term "competency" has a long history, and remains controversial. For many it cannot be divorced from its origins in work training and skill development. The concept of defining and standardizing competencies began with industry as early as medieval guilds, in which apprentices had to demonstrate mastery of a set of job-related "competencies."

Relatedly, the competency-based approach of defining demonstrable skills and knowledge is criticized for narrowing the purpose of education to simply preparing students for employment. University of Toronto professor Nancy Jackson, an expert in adult education and skills training, lodged a similar complaint decades ago. "The competency format," Jackson wrote, "requires educational goals to be specified in terms of 'behaviors' and 'performances' rather than in terms of knowledge and understanding."[ii] This, Jackson and others argue, limits competency to certain areas of study and, accordingly, to certain populations of students. It is easier, for example, to define the skills needed to be a brick mason than those needed to be a genetic counselor.[iii]

Competency continues to mean many things in many contexts, and there is huge variation in the models that call themselves competency-based, both across and within K-12 and higher education. Most are indistinguishable from "proficiency-based" and "performance-based" models, and many dovetail with blended and online learning efforts.[iv] Whether or not "competency-based" sticks—it is certainly the term du jour—a growing number of institutions are redesigning themselves based on its underlying concepts: that direct assessments are better measures of learning, that student learning can and should be personalized, and that creditworthy learning should not be confined to traditional institutional structures.

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[i]   Colby, "Is a Standard a Competency?".

[ii]   Jackson, "The Case Against 'Competence'."

[ii]   Both are among the fastest-growing occupations according to the 2013 Employment Projections program of the US Department of Labor, US Bureau of Labor Statistics.

[iv]   See Kennedy et al., "Mean What You Say."

"competency-based education," a potentially more personalized and less expensive instructional model that permits students to progress when they have demonstrated mastery of the subjects they're studying, "moving on when ready" rather than advancing (or failing) at course's end.[43] [See Competency-based Education, Page 20]

Critics claim that the Carnegie Unit's powerful standardizing influence on the design and delivery of American education—which its founders sought as a way of establishing a minimal standard for high school diplomas—is impeding educators' ability to take advantage of these developments through more flexible educational designs and delivery strategies. The traditional "grammar of schooling"—the typical school day, teacher and faculty workloads, the role of student-teacher contact hours in the awarding of credits, and many other organizational structures that have the Carnegie Unit at their foundation—makes it more difficult to shift the scheduling and pacing of study and to recognize learning outside of traditional courses. In *Tinkering Toward Utopia: A Century of Public School Reform*, Stanford scholars David Tyack and Larry Cuban summarize reformers' critiques of the Carnegie Unit: "[It has] frozen schedules, separated knowledge into discrete boxes, and created an accounting mentality better suited to a bank than to a school."[44] Discussing the potential of learning science to improve instruction, Keith Sawyer, a professor of psychology and educational innovation at the University of North Carolina in Chapel Hill, notes in a report by the Organisation for Economic Co-operation and Development that "the structural configurations of traditional schools make it very hard to create learning environments that result in deeper understanding."[45]

> The challenge is to maximize flexibility without eliminating some minimum guarantee of instructional time, or opportunity to learn, especially for traditionally underserved students.

FLEXIBILITY REFORMS AND THE CARNEGIE UNIT

A close examination of today's flexibility reforms suggests that the Carnegie Unit plays a more nuanced role than some reformers suggest. It has been a barrier to innovation in some instances but not others, and reformers' efforts to untether the delivery of instruction from the Carnegie Unit raise substantial questions about the quality of the new models and whether they can serve all students equitably.

Flexible Schedules

At Rio Salado Community College in Maricopa County, Arizona, almost every week is registration week. The 60,000-student institution permits students to start online courses at forty-eight different times during the year, making it possible for them to start and finish their studies when convenient rather than waiting months for the beginning of the next semester. Abandoning the traditional academic calendar of higher education is an increasingly popular strategy for institutions serving older students who must balance work and family responsibilities. Students benefit from greater flexibility and total instructional time remains unchanged.

High schools, where students have historically marched lockstep with their classmates from September to June, are also looking to flexible schedules to meet their students' needs. At Boston Day and Evening Academy (BDEA), a charter high school in the Roxbury section of Boston, a flexible calendar allows the school's 350

students—most of whom are over-aged and have dropped out of other high schools—to restart their educations and move on to post-secondary pursuits when they are ready. They can graduate in September, December, March, or June—whichever date comes immediately after they have demonstrated all of the school's 317 required competencies (72 in science, 107 in math, 119 in the humanities, and 19 in technology) and completed an interdisciplinary capstone project of their own design.[46]

While many state time mandates can be traced to the Carnegie Unit—and some reference the Carnegie Unit's "seat-time requirements" directly—a number of states are modifying their laws and regulations.

But the flexibility of Boston Day and Evening is uncommon among public high schools. Unlike higher education, which has far more flexibility to design schedules to fit students' need and preferences, public schools are bound by state instructional time requirements. While state policies vary, most require schools to offer a minimum of 900 instructional hours over a period of at least 180 days, and some set standards by minutes-per-day or even per-class-period. South Carolina, for example, defines class periods as fifty minutes and requires a minimum of 200 instructional minutes per day.[47] Some states also require that the school year not begin before Labor Day, precluding the summer months from the official school calendar.[48] These time requirements not only determine scheduling, but serve as the basis for determining teacher work requirements and for calculating student attendance ("average daily membership"), which drives funding for both traditional school-based learning and on-line instruction.[49]

While many state time mandates can be traced to the Carnegie Unit—and some reference the Carnegie Unit's "seat-time requirements" directly—a number of states are modifying their laws and regulations to permit staggered staff schedules, online learning, Saturday schooling, and a host of other variations in how the school day and year are organized.[50] Some states are taking these steps under existing statutory and regulatory flexibility.

This experimentation is valuable in an era when it's increasingly important to get students to and through post-secondary education, a step requiring both the improvement and acceleration of learning. The challenge is to maximize flexibility without eliminating some minimum guarantee of instructional time, or opportunity to learn, especially for traditionally underserved students. Educational research clearly documents a strong relationship between high quality instructional time and student learning.[51]

Flexible Pacing

Colorado's Adams County School District 50 in suburban Denver is one of a small but growing number of school systems that has embraced competency-based designs, allowing students to advance through material at whatever pace suits them, unimpeded by the traditional time requirements of the Carnegie Unit. In 2009, three years after being labeled one of Colorado's seven struggling "turnaround" districts and facing the loss of its accreditation, Adams 50 replaced its traditional grade structure with fourteen performance levels in every subject. Under the new model, students can progress from one level to the next however quickly—or slowly—they can demonstrate proficiency in the material at a given level. As a result, students can find themselves at different levels in different subjects—in level eleven in English, for instance, and level nine in math—and classrooms include students of varying ages.[52]

Under another competency model, Arizona's Grand Canyon High School Diploma allows high school students to earn course credits when they demonstrate readiness for college-level course-work by passing a series of required subject-area exams. Arizona introduced the diploma as part of legislation that allows schools to free themselves from the traditional time-based system to provide rigorous, personalized pathways for all students, not just fast learners. Students can complete the assessment sequence and earn the diploma in as few as two school years. After that, they can enroll full-time at a community college or technical school; they can remain in high school and earn college credit through "dual enrollment" or "early college" models (where such options exist); or they can pursue advanced high school course-work through Advanced Placement, International Baccalaureate, and other specialized programs. A small but growing number of students are pursuing the alternative diploma; in the thirty high schools that offer it, seven students qualified for the Grand Canyon High School Diploma on a two- or three-year track in the 2012-13 school year. That number grew to twenty-nine in 2013-14. Sixty students are projected to earn the diploma in 2014-15, the program's fourth year. In contrast, students in public education traditionally have had to obtain special dispensation in the form of waivers or accommodations to use self-paced models, while alternative school designs and teaching models have been more common in special education programs and in private and public charter schools where, by law or demand, structures have been less constrained by the Carnegie Unit.

Federal Flexibility for K-12 Education

The Obama administration encouraged new, more flexible education models through its signature Race to the Top, Race to the Top—District, and Investing in Innovation grant competitions. Though they weren't designed to eliminate the Carnegie Unit, each competition encouraged the reconsideration of time-based measurement of student progress. Applicants for the first round of Race to the Top grants were told, for example, that the "Secretary [of Education Arne Duncan] is particularly interested" in applications from state education agencies that provide "flexibility and autonomy" for districts and schools interested in, among other things, "awarding credit to students based on student performance instead of instructional time."[i]

Similar language in the Investing in Innovation program encouraged applicants to consider competency-based credit systems as a promising strategy for school turnaround.[ii] And under the Race to the Top—District competition, which sought to promote "personalized learning environments," applicants earned extra credit for strategies "giving students the opportunity to progress and earn credit based on demonstrated mastery, not the amount of time spent on a topic" and for "giving students the opportunity to demonstrate mastery of standards at multiple times and in multiple comparable ways."[iii] Twelve of the sixteen winning school districts proposed projects to transition schools away from strict adherence to time-based measures of student learning.

[i] US Department of Education, "Race to the Top," 5.

[ii] Pace, "Competency Based Education," 6.

[iii] Federal Register: Proposed Priorities, Requirements, Definitions, and Selection Criteria-Race to the Top-District (April, 2013). https://www.federalregister.gov/articles/2013/04/16/2013-08847/proposed-priorities-requirements-definitions-and-selection-criteria-race-to-the-top-district-cfda.

Western Governors University

Western Governors University (WGU), one of nation's largest providers of non-traditional higher education with over 52,000 students from fifty states learning exclusively online, permits its students to learn when, where, and at what speed they like, unbound by credit hours and traditional semester sequences. Founded in 1998 by a bi-partisan group of governors in nineteen states to expand access to higher education, especially for working adults in rural areas who had few other options, WGU allows students to enroll on the first of any month. Students earn "competency units" by showing what they have learned through proctored exams, activities, and projects, roughly half of which are scored by remote graders using detailed rubrics. Once they have demonstrated their grasp of required competencies (about 120 for bachelors' programs and about thirty-five for masters' programs) students earn their degrees. They graduate whether it takes them twelve, twenty, or thirty-six months.

The Internet has been a powerful catalyst for competency models, and the primary source of the strategy's potential cost savings. The WGU model has lowered the cost of higher education for many of its students, who pay roughly $3,000 per six-month period. With the average WGU student earning a bachelor's degree in thirty months (compared to a national median of fifty-five months at four-year public institutions), that adds up to total tuition bills of $15,000, compared with a national average of $40,000 for public institutions.[i]

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[1] US Department of Education, "Digest of Education Statistics."

K-12 educators frequently suggest that state policies require them to adhere to traditional instructional pacing linked to the Carnegie Unit. And some states do make public education course credits dependent upon students spending specific amounts of time in classrooms. But a Carnegie Foundation analysis of state policies for this report found few prohibitions against school systems uncoupling course credits from instructional time; while the extent and nature of flexibility varies considerably from state to state, a majority of states have no laws or regulations prohibiting public school systems from using alternatives to the Carnegie Unit to measure student progress.[53]

And many states that do tie course credits to instructional time are considering revising their regulations, including North Carolina and the District of Columbia. In Pennsylvania, where the use of time- or proficiency-based credits is already allowed, a gubernatorial panel recently called for a "new, individualized approach" to education. In its report "Awarding Credit to Support Student Learning," the panel noted that different types of students and their parents "are asking schools to provide new and diverse models of course delivery, and models that incorporate educational technology and emphasize the student's ability to master course content."[54] In addition, the Obama administration has empowered states and school systems to pursue regulatory relief from the US Department of Education that would allow new educational designs in elementary and secondary education. [See Federal Flexibility for K-12 Education, Page 23]

The widely shared perception among public educators that they're locked into using the Carnegie Unit, combined with an inclination to adhere to traditional practices, has slowed the pace of change. School systems' continuing commitment to the traditional four-year, Carnegie Unit-based high school sequence, for example, has been a significant factor in the relatively slow uptake of initiatives to move students through the education pipeline more efficiently.

There is a much wider range of designs and delivery strategies already in place in higher education today, with the nation's thousands of colleges and universities providing many different paths to associate's, bachelor's, master's, and doctoral degrees, and dozens of workforce credentials.[55]

But efforts to further push the boundaries of the design and delivery of higher education face a substantial barrier: the federal government's requirement that most students taking part in the $150 billion federal financial aid program attend colleges or universities using Carnegie Units.[56] Borrowing from the original Carnegie Unit standard that a course include contact "weekly for an academic year," federal policy requires students to attend institutions that provide them "not less than one hour of classroom or direct faculty instruction and a minimum of two hours of out-of-class work each week for approximately fifteen weeks for one semester."[57] And although regulations give institutions some flexibility—allowing, for instance, for "equivalent amount of work over a different amount of time"—they encourage colleges and universities to offer traditionally-paced programs structured around Carnegie Units.[58]

There are a number of competency-based initiatives underway in higher education despite the constraints of the federal financial aid regulations. Southern New Hampshire University's College for America (SNHU), for example, has abandoned traditional semesters and credit hours, and students must master subject-specific competencies, foundational proficiencies such as digital fluency, and social skills like teamwork. For tuition of $2,500 a year, students can complete as many competencies as their time and talent permit, allowing them to earn degrees at widely varying speeds. The college has created project-based tests for each of the program's required competencies. Students demonstrate the competencies by completing the projects, such as developing a marketing plan or revising a budget, and meeting related criteria, such as "reasoning is supported by evidence" or "calculations are accurate." Reviewers grade student work with a "yes" or "not yet" for each criterion, and students can continue to revise and resubmit work until all of the criteria have been met. The private non-profit college has enrolled just over a thousand students since its pilot launch in 2013. College for America's first graduate, Zach Sherman, a twenty-one-year-old sanitation worker in Ohio, earned a general studies associate degree in under four months, working nights and spending up to six hours a day on coursework.[59]

To promote competency models in higher education, the Obama administration has endorsed a provision in the federal financial aid regulations that extends eligibility under the program to students at institutions that use "projects, papers, examinations, presentations, performances, portfolios" and other "direct" measures of learning "in lieu of credit hours or clock hours" to gauge student performance. It initially extended "direct assessment" privileges to two institutions, Capella University, a for-profit online provider, and Southern New Hampshire University's College for America. The University of Wisconsin's Flexible Option, which is led by UW-Extension, received approval for direct assessment in August 2014.

Capella, SNHU, and University of Wisconsin students must continue to meet the federal financial aid requirements for instructional time, including student attendance and the length of the academic year.[60] But the Carnegie Unit hasn't been

> There are a number of competency-based initiatives underway in higher education despite the constraints of the federal financial aid regulations.

an insurmountable barrier here, either. Capella, SNHU, and other higher education institutions using competency models have complied with federal requirements by supplementing, rather than supplanting, traditional student transcripts. "There have been compromises," says SNHU president Paul LeBlanc. "We map competencies back to credit hour equivalencies so we can produce a [traditional] transcript. We are bowing to the reality of the world and how it sees education. A list of competencies and whether they master them isn't enough. So we have a family of competencies that in their weight and rigor match the credit hour."[61]

Indeed, dual reporting systems of the sort LeBlanc describes have become increasingly common among competency-based institutions in both K-12 and higher education as a way of circumnavigating the Carnegie Unit.[62] Students in Northern Arizona University's competency-based bachelor's programs, for example, now receive two transcripts, one traditional and one competency-based, as well as optional training on how to share the competency-based version with potential employers.[63] And Massabesic High School in Maine's Regional School Unit 57, just west of Portland, uses standards-based report cards to provide qualitative information about student learning, but supplements that information with grades expressed in percentages, a format more familiar to parents.[64]

But personalizing the pace of instruction presents challenges beyond reporting that would have to be overcome if the Carnegie Unit were eliminated. One potential problem is that competency models may privilege some students over others. The widespread adoption of move-on-when-ready systems could speed the progress of more accomplished and affluent students (who tend to have many out-of-school learning experiences and are often tutored over academic hurdles), while their

peers are left to struggle and possibly fall further behind.

In Colorado's Adams 50 district, students have not yet begun to move at dramatically different paces under the district's new system of grouping students by performance level rather than age. But officials there say they're concerned about the potential of widening achievement gaps and social challenges as some students outpace their same-aged peers while others languish in courses they cannot pass. The prospect of eight-year-olds in Algebra II or eighteen-year-olds in eighth grade reading are significant concerns for teachers, students, and parents. The last thing they want, they say, is to introduce a strategy that ends up hurting the very students it's intended to help.

Competency-based models also present instructional challenges. To give struggling students the support they need under competency systems—to take advantage of the additional time to learn that move-on-when-ready models afford—teachers in traditional classrooms must be able to differentiate instruction to a greater degree than has been possible in the past. That's a significant hurdle, given that teachers already rank differentiation among their greatest professional challenges. And given that schools in low-income areas tend to have higher percentages of less-experienced teachers, the instructional demands of competency models are likely to compound the challenge of ensuring that competency-based systems don't exacerbate opportunity gaps between groups of students. In online instructional settings where there is often less teacher support, the prospect of instructional disparities is even greater. At the same time, competency models, by focusing students on the acquisition of discrete skills, may make it more difficult to promote inter-disciplinary teaching, collaborative learning, and other instructional strategies that the latest research in learning science encourages—and the

deeper, integrative learning that flows from those instructional strategies.

Higher education institutions are grappling with how best to support struggling students. Critics of competency-based programs like those offered online at Western Governors University (WGU), for example, say the use of coaches and mentors rather than traditional faculty to support students saves money and is fine for highly motivated students, but that the model is insufficient for students who need more support. Student reviews of WGU tend to praise its convenience and flexibility, but suggest that the design requires a high level of student initiative and persistence.[65]

Portmont College, an online non-profit branch of Mount St. Mary's College in Los Angeles, organizes its online students into small cohorts, each led by a team of "success coaches" and a mentor. The model is designed specifically for students that "haven't had good experiences with traditional institutions," says Srikant Vasan, Portmont's founder and president. "They need a design that gives them support, social and emotional support and learning support, if they are going to succeed."[66]

But such supports are expensive. Portmont has relied on grants from the Bill & Melinda Gates Foundation and other philanthropies to fund its extensive student services. Lacking these academic and social supports, it is unclear whether online competency programs can produce hoped-for cost savings for students without sacrificing achievement.

> Competency models, by focusing students on the acquisition of discrete skills, may make it more difficult to promote inter-disciplinary teaching, collaborative learning, and other instructional strategies that the latest research in learning science encourages—and the deeper, integrative learning that flows from those instructional strategies.

Like Boston Day and Evening Academy, many schools at the forefront of the competency movement in K-12 education focus on over-aged, under-credited students—students who often require extensive support. Boston Day and Evening provides round-the-clock course offerings, ample remediation opportunities, intensive post-secondary advising, and counseling for its homeless and other high-risk students. Paying for these timely, individualized supports has required BDEA to raise money above and beyond its funding from the Boston school system.

And there's no guarantee that higher education institutions will accept K-12 competencies, or that graduate programs will accept competencies from undergraduates. "Can we expect faculty to accept a badge or an assessment of competency as a basis for admission to graduate study?" asks John Ebersole, president of Excelsior College, one of the nation's first competency-based colleges. "Experience suggests not."[67]

Ultimately, the quality of competency-based programs rests with the rigor of their assessments, many of which are administered online. There is an immense amount of engineering effort going into the development of high quality competency-based programs. But absent ways of making the quality of the competencies transparent through rigorous, externally validated assessments, competency systems must rely on individual teacher or professor judgment. In those instances, there are no guarantees that the quality of instruction or the level of learning are any higher than under

traditional instruction—and the track records of many for-profit online education providers suggest they could be worse. Indeed, a fast-growing technology sector is working to profit from competency-based education, diluting the promise of instructional innovation with low-quality programs like those that have proliferated in pursuit of federal financial-aid monies.

The same problem exists in elementary and secondary education. New Hampshire eliminated the Carnegie Unit in its public schools statewide in 2005 and requires its districts to base students' advancement on their mastery of locally developed competencies. It created a statewide "Competency Validation Rubric" to help districts gauge the quality of their assessments. Though the state is comfortable deferring to districts' judgment—New Hampshire is a fervently "local control" state—officials there acknowledge that despite the guidance and resources they've provided to districts, the quality varies greatly. "From school to school, from department to department," says Rose Colby, who consults for the state on competency designs, "you see the good, the bad, and the ugly."[68] So, while there's appeal in shifting away from time-based to competency-based instructional models, doing so could exacerbate inequities already present in the system.

Nontraditional Credit

Carnegie Unit requirements, as many suggest, do present a challenge to the third major strand of design flexibility: giving secondary and post-secondary students credit for apprenticeships, self-study, and other non-course learning in an effort to speed their progress toward completion and, especially in higher education, lower the cost of degrees.

At the K-12 level, the state of Rhode Island now allows students to earn recognition for "expanded learning opportunities" (ELOs) such as internships, apprenticeships, and independent study. Students demonstrate mastery of what they're studying through electronic portfolios comprised of essays, video and slide presentations, journal entries, and letters from advisors. Regular classroom teachers must approve the projects, grade the portfolios, and sign off on credit when they are satisfied the learning is complete—a tricky task since teachers do not directly oversee students' outside work, and an example of how efforts to increase flexibility are sometimes in tension with efforts to make student performance more transparent. In Ohio, where state policy requires every district to offer credit for outside learning, policymakers are seeking to address the challenge by judging student work from multiple perspectives. Teachers can get help determining the creditworthiness of outside projects from teams of peers, panels of community members, or a state performance-based assessment.[69]

Some change advocates are pressing to permit students to test out of courses through so-called "prior-learning assessments." Here, too, federal reliance on the Carnegie Unit in financial aid regulations has slowed, but not eliminated, the spread of the practice.

Granting credit for prior learning was popularized in higher education after World War II as tens of thousands of veterans returned home and the American Council on Education, a higher education association that represents institutional presidents and chancellors, began offering credit for military experience.[70] In the decades that followed, "external degree programs" emerged at a variety of institutions to recognize a range of real-world pursuits. In the 1970s, The Carnegie Foundation's Commission on Higher Education endorsed credit for training and experience outside of formal institutions.[71] In 1974, the Educational Testing Service, the standardized testing company, established a panel to study "experience-based" learning. That work led to the establishment of the Council for Adult and Experiential Learning

(CAEL), which created standards for awarding credit for experience. Today, CAEL runs an online service called Learning Counts, which charges students a fee for a portfolio-based assessment (and a credit valuation) of their prior learning.

The largest credit-by-exam program is the College Level Examination Program (CLEP) sponsored by the College Board. CLEP administers tests in nearly three-dozen subjects ranging from biology to history, business, and foreign languages. But unlike the College Board's better-known Advanced Placement program, CLEP doesn't supply schools with a curriculum to prepare high school students for the tests. Rather, students of any age can take the ninety-minute, eighty-dollar "prior learning assessments" whenever they please. If they pass the examinations, they earn credits at some 2,900 (mostly less-selective) two- and four-year colleges.[72]

New Jersey's Thomas Edison State College is among the higher education institutions that award credits for outside learning and experience through CLEP and other assessments.[73] Named after the famous inventor who gained much of his knowledge from self-directed learning, Edison serves roughly 21,000 adult students, many with knowledge and skills acquired from the military or the workplace. Edison makes it possible for them to earn credit for this learning through credit-by-exam programs, portfolio assessments, and generous transfer policies that award credit for military training and professional certifications and licensure. Some 10 percent of Edison's 2012 graduates did not earn a single credit through Edison courses.[74] "We're completely vested in student learning," says Marc Singer, vice provost for Edison's Center for the

It's possible that at some point in the future new metrics of student learning might replace use of the Carnegie Unit as an indicator of student progress while still serving as a common administrative currency.

Assessment of Learning. "We just don't care where the students get the learning."[75]

In a 2010 study of more than 62,000 students at forty-eight colleges and universities, CAEL found that students who received credit for prior learning were two and half times more likely to graduate than students without prior learning credits.[76] Students of color were the greatest beneficiaries; Hispanic students with prior learning credits (assessed by a range of instruments, including CLEP exams and portfolios of student work) earned bachelor's degrees at nearly eight times the rate of Hispanic students without them.[77]

The challenge is that students cannot receive federal financial aid for prior learning. The regulations require that federal funds can only be used "for learning that results from instruction provided, or overseen, by the institution" and that students "must interact with the faculty member on a regular and substantive basis."[78] So students at Thomas Edison and other colleges and universities earning credit through CLEP and other prior-learning measures are doing so largely without the support of federal aid. Some of the institutions seeking to join SNHU, Capella, and Wisconsin under the federal direct-assessment initiative are urging the federal government to ease the financial aid requirements for institution-sponsored learning. If they are successful, the number of colleges and universities awarding credit for prior learning is likely to increase significantly.

As with competency-based education, the larger challenge to the expansion of prior learning is unrelated to the Carnegie Unit: ensuring that the experiences receiving credit are sufficiently rigorous. CLEP and other comparable exams represent

a step towards quality control at the college level. But relying on individual classroom teachers to gauge the creditworthiness of apprenticeships and other non-traditional learning experiences invites the same widely varying grading standards that exist in traditional classrooms.

CONCLUSION

We have examined the Carnegie Unit's origins, its current uses in American education, and, in particular, its relationship to efforts currently underway to improve schools and colleges by making the K-12 and higher education systems more transparent and more flexible.

We found places where the Carnegie Unit has been a barrier to such efforts. But suddenly eliminating the Carnegie Unit would make it very difficult for institutions and students, educators, and administrators to function efficiently, especially in an increasingly complex educational landscape. Whatever challenges the Carnegie Unit may pose, in its absence there would be no common language to organize the work of schooling and communicate student accomplishments across a wide range of institutions.

Perhaps no one understands this challenge better than the school and college administrators who rely on the Carnegie Unit to manage institutional finances and student records. Registrar offices in higher education particularly struggle with the prospect of working without the Carnegie Unit. "It's hard to imagine what we report that isn't credit based," says Reid Kisling, dean of student development at Western Seminary in Portland, Oregon, and a consultant to the American Association of Collegiate Registrars and Admissions Officers. "It's federal [student financial] aid, but it's also how we calculate credit for scholarship students, full-time status for

international students, veteran's benefits, faculty work. It's in all of our budgets."[79] "It would be very challenging to try to do sense-making on the scale that we do without some kind of quantitative measure," adds Kathleen Massey, the registrar and director of enrollment services at McGill University in Quebec.[80]

Former Carnegie Foundation President Lee Shulman has summed up the challenge succinctly: "There is nothing simple about measuring the quality of learning. The reason for the robustness of the Carnegie Unit is not that it's the best measure, just that it's much more difficult than folks think to replace it."[81]

Even institutional leaders in the vanguard of change in higher education agree. "We wrestled with whether we could [build the WGU model] without time [as a measure of student progress]," says Peter Ewell, vice president of the National Center for Higher Education Management Systems and an early partner in designing WGU. "How were we going to handle teaching loads and fund student support services?"[82] In the end, WGU chose to continue using the credit hour.

It's possible that at some point in the future new metrics of student learning might replace the Carnegie Unit as an indicator of student progress, with the Carnegie Unit continuing to serve as a common administrative currency. But at present there is too little evidence to claim with confidence that shifting away from the Carnegie Unit would lead to improved student performance and diminish the inequities and inefficiencies in American education.

For now, the Carnegie Unit's value in providing a minimum instructional standard for all students shouldn't be underestimated. If the quality of teaching and learning already differs dramatically from class to class (and from online platform to online platform), the level of learning might vary even more substantially in the absence of the Carnegie Unit—at least until an

improved standards and assessments infrastructure is implemented.

Moreover, disadvantaged students—students for whom inequitable resources and variable quality are more the rule than the exception—would likely be at greatest risk in such an environment. In a recent class-action lawsuit against the State of California, a group of low-income high school students asserted their right to an equal opportunity to learn, noting, "There are few absolutes in education, but none more fundamental than this: learning takes time."[83] At a minimum, the Carnegie Unit ensures students equal time to learn.

The Carnegie Unit is not the impenetrable barrier to innovation and improvement that some have suggested. Tradition and perceived impediments to change can slow reform as much as regulatory prohibitions can. But the pursuit of greater transparency and flexibility in American education in an important aspiration that the Carnegie Foundation shares.

We applaud the work of the Lumina Foundation's Degree Qualifications Profile, the many secondary and postsecondary institutions trying new educational designs, and the state and regional regulatory agencies enabling this experimentation. Both federal and state policymakers could encourage more experimentation by pointing to opportunities available to educators under existing statutes, and by providing incentives and technical assistance to education leaders embracing change. The Obama administration has taken steps in that direction by funding educational models through its Race to the Top, Investing in Innovation, and First in the World grant programs

> **We applaud the work of the Lumina Foundation's Degree Qualifications Profile, the many secondary and postsecondary institutions trying new educational designs, and the state and regional regulatory agencies enabling this experimentation.**

that award students credit based on performance rather than just instructional time.

Where the Carnegie Unit is clearly a barrier to innovation—as with federal financial aid regulations and accrediting agency regulations that measure institutional productivity with credit hours—the Foundation urges policymakers to enable changes through regulatory relief and other policy shifts. One encouraging sign is the federal government's recently launched experimental-sites initiative, which creates opportunities for institutions to participate in the federal financial aid program without having to report student progress using Carnegie Units.[85] Also promising is the possibility of a congressionally approved demonstration project that would grant waivers from certain regulatory requirements, thereby enabling institutions and systems to freely test and evaluate new models.[86]

But our research leads us to conclude that the most important step educators and education policymakers should take toward making American education a more transparent and flexible enterprise is to systematically test new learning standards, high-quality assessments, and accountability models that focus greater attention on student learning—exploring not only which innovations work, but for whom and in what circumstances.

A great deal of very difficult design, development, and improvement work needs to be done to build the standards and assessments required to make education more transparent and to transform emerging design innovations from compelling concepts to sources of educational rigor at scale.

An important dimension of that work is resolving significant tensions inherent in the quests for greater transparency and increased flexibility. On the one hand, the inclination in competency-based education and other personalized learning strategies to atomize curriculum and assessment at the expense of more integrated learning poses a potentially serious challenge to deeper learning. There is a danger that the flexibility movement's focus on individual skills may slow the spread of richer teaching and testing that require students to synthesize knowledge and do other advanced work.

The transparency movement, on the other hand, is rooted partially in a lack of trust in the ability of educators to make professional judgments about student progress. But in the absence of rigorous external standards and the equally demanding assessments of student learning that must necessarily follow, competency-based educational designs are likely to rely heavily on individual educators to judge the creditworthiness of student work, with the same uneven results that exist currently.

If the Common Core State Standards and Lumina's Degree Qualifications Profile represent promising steps toward achieving consensus on the advanced skills and knowledge students should possess, the task of translating such standards into curricular frameworks is demanding. Difficult too is the challenge of aligning expectations in elementary and secondary education with those of higher education, a necessity in an educational system that affords students more flexible options for earning high school diplomas.

It's also the case that many of today's experiments with alternatives to the Carnegie Unit originated with institutions serving relatively narrowly defined groups of students—over-aged high school students, for example, and college students seeking occupational training. We must understand whether these alternatives can promote more effective, equitable, and efficient learning throughout the educational enterprise.

Finally, it will be difficult to make the performance of schools and colleges more transparent and to build more flexible (and ultimately more personalized) educational models without systems of accreditation and other accountability mechanisms that require detailed information on student learning.

> Our research leads us to conclude that the most important step educators and education policymakers should take toward making American education a more transparent and flexible enterprise is systematically testing new learning standards, high-quality assessments, and accountability models that focus greater attention on student learning—exploring not only which innovations work, but for whom and under what circumstances.

In recent years, the Carnegie Foundation has developed methods for institutions to work together to build solutions to common challenges. Drawing on the lessons of improvement science, teams of researchers and practitioners study problems from a variety of perspectives, identify promising solutions, and use a disciplined approach to test them, scaling what works and identifying alternatives to what doesn't. The idea is to start small and learn fast in networks of institutions tackling common problems—what

Carnegie calls "networked improvement communities." Particularly in higher education, where there is a tradition of institutions trying to solve common problems individually, working in networks guided by disciplined inquiry could bring about effective change at scale with greater efficiency.[83]

The reauthorizations of the federal Higher Education Act and the Elementary and Secondary Education Act present opportunities to support a range of similar networks to build and test the new standards, assessments, and designs necessary for the modernization of American education. As these new systems prove themselves, the reliance on the Carnegie Unit as a proxy for student learning may begin to diminish. In this context, the Carnegie Unit today is more of a bridge to the future than a barrier from the past.

While one organization may have played a central role in creating the Carnegie Unit a century ago, it's clear that no single institution in today's vastly larger and more complex educational landscape can by itself construct a new measure of student progress that makes learning more transparent and enables new, more flexible educational designs than those derived from the Carnegie Unit.

The Carnegie Foundation supports the vision of a more effective and efficient educational system in the United States, and it stands ready to help educators at all levels of the system study the best ways to achieve that end—as a national convener, a leader of improvement coalitions, and a provider of technical assistance to networks of institutions and organizations testing solutions to the major challenges outlined in this report. ∎

ENDNOTES

1 Carnegie Foundation, *First Annual Report*, 7.

2 "I have reached the conclusion that the least rewarded of all the professions is that of the teacher in our higher educational institutions . . . I have, therefore, transferred to you and your successors, as Trustees, $10,000,000 . . . to provide retiring pensions for the teachers of universities, colleges and technical schools." Andrew Carnegie, Letter of Gift to the Trustees of the Carnegie Foundation for the Advancement of Teaching, April 16, 1905.

3 The four-year bachelor's degree preceded any nineteenth century standard-setting. When Reverend Henry Dunster was named the first president of Harvard in 1639, he successfully pushed for the bachelor's to change from a three-year to a four-year degree to mirror the practice of Cambridge in his native England. Notably, in the years that followed, Cambridge changed to a three-year degree.

4 Carnegie Foundation, "Rules for the Granting of Retiring Allowances," 762.

5 Brubacher and Rudy, *Higher Education in Transition,* 16.

6 According to the Bureau of Labor Statistics inflation calculator, Carnegie's $10,000,000 would be worth roughly $260,000,000 in today's dollars.

7 Carnegie Foundation, *First Annual Report,* 37. Two years later, Andrew Carnegie granted an additional $5 million to expand the pension fund to state universities, which had initially been excluded from participation along with sectarian institutions, followed by $1.25 million more in 1913.

8 In 1909-10, the high school graduation rate was 8.8 percent, a number that tripled in the next twenty years. See Snyder, "120 Years of American Education."

9 National Education Association, "Report of the Committee of Ten," 53.

10 Carnegie Foundation, *First Annual Report,* 37. Three years later, the National Conference Committee on Standards of Colleges and Preparatory Schools was formed. Comprised of seven national and regional organizations, including the College Entrance Examination Board (CEEB) and the Carnegie Foundation, the Conference spent several years further clarifying the definition of the unit to be "a year's worth of study in any subject in a secondary school, constituting approximately a quarter of a full year's work." This definition was published in the Foundation's 1909 annual report and endorsed by the CEEB and most regional associations.

11 Cooke, *Academic and Industrial Efficiency,* 19.

12 Wellman, "The Student Credit Hour," 20.

13 The passage of the Morrill Act in 1862, which created state-supported land-grant universities, was the first major effort to expand access to higher education in the US. A second Morrill Act was passed in 1890 to support African-American land-grant institutions. By the time of the Carnegie Unit, the population and the need for a more systemic approach to higher education were both growing.

14 US Secretary of Education, remarks for the announcement of the High School Redesign Initiative, June 2013.

15 Carnegie Foundation, *Annual Report, Vol. 29,* 34.

16 Wellman and Ehrlich, "The Credit Hour, The Tie That Binds."

17 Pascarella and Blaich, "Lessons from the Wabash National Study." Also see Finley, "Making Progress?"

18 Bailey, Jeong, and Cho, "Referral, Enrollment, and Completion." American Association of Community Colleges, 2014.

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19 US Department of Education, "A Test of Leadership: Charting the Future of U.S. Higher Education."

20 There are seven regional accrediting commissions in six regions. In addition, there are four faith-based and seven national career-related accreditors for institutions, and sixty-two accreditors that approve specific programs, usually in professional fields. All accreditors are themselves accredited either by the US Department of Education or by the Council for Higher Education Accreditation (CHEA).

21 Some specialized accrediting organizations, like those dedicated to various health professions, have long been collecting outcomes data because of professional licensing requirements.

22 WASC Senior College and University Commission. Explanation of the Undergraduate Student Success and Graduation Rate Dashboard Pilot. http://www.wascsenior.org/resources/about-undergraduate-student-success-and-graduation-rate-dashboard-pilot#"FAQ5". Accessed December 19, 2014.

23 James Pellegrino, interview with the authors, February 2013.

24 Education Testing Service, *Sea Change,* 19.

25 The Open Learning Initiative (OLI) was created in 2002 at Carnegie Mellon University but expanded to Stanford University when OLI Founding Director Candace Thille moved to Stanford in 2012.

26 Laitinen, "Cracking the Credit Hour."

27 Ibid. Also see Farrington, *Failing at School.*

28 Besvinick, "The Expendable Carnegie Unit," 365.

29 Farrington and Small, "A New Model of Student Assessment."

30 Other recent learning outcome frameworks include the Liberal Education and America's Promise (LEAP) framework of the Association of American Colleges and Universities; the Assessment and Teaching of 21st Century Skills, created in 2009 as part of a collaborative research effort of Cisco, Intel, and Microsoft; and the National Qualifications Framework that emerged out of the European Bologna process. Beyond Europe, more than one hundred individual nations and several other regions, including Latin America, have adopted similar qualification frameworks. See more about higher education outcomes frameworks in Markle et al., *Synthesizing Frameworks of Higher Education Student Learning Outcomes.* For more about international frameworks, see Allias, "The Implementation and Impact of National Qualifications Frameworks."

31 Carol Geary Schneider, interview with the authors, March 2013.

32 Norm Jones, interview with the authors, February 2013.

33 Organisation for Economic Co-operation and Development, "Assessment of Higher Education Learning Outcomes." Over the past five years, the OECD has carried out a feasibility study to evaluate the efforts of 249 institutions across seventeen countries and regions to assess what students in higher education know and can do upon graduation. The United States began participating in AHELO in 2010. Three states, Connecticut, Missouri, and Pennsylvania, participated with the help of the State Higher Education Executive Officers Association (SHEEO), along with eleven other individual institutions.

34 HCM Strategists, "A Better Higher Education Data and Information Framework."

ENDNOTES

35 The two consortia, Partnership for Assessment of Readiness for College and Career (PARCC) and Smarter Balanced Assessment Consortium (SBAC), have been endorsed by most states, although recently several states, like Oklahoma, Pennsylvania, and Georgia, have partially or fully opted out in favor of their own state exams. There are also three additional consortia serving special populations of students: The National Center and State Collaborative (NCSC) Partnership and the Dynamic Learning Maps (DLM) Alternate Assessment System Consortium are developing a new generation of assessments for students with the most significant cognitive disabilities, while the Assessment Services Supporting English Learners Through Technology Systems (ASSETS) Consortium is developing assessments for English-language learners.

36 Council for Chief State School Officers, "Roadmap for Next Generation Accountability."

37 Millett et al.,"A Culture of Evidence." Researchers at the Educational Testing Service identified twelve of the most prevalent assessments of student learning outcomes, including the CLA, in postsecondary education.

38 Pellegrino and Hilton, *Education for Life and Work,* x. Also see Bransford et al., *How People Learn.*

39 Wolfe et al., *Anytime, Anywhere.*

40 US Department of Education. "Digest of Education Statistics."

41 iNACOL, "Fast Facts about Online Learning.." For a comprehensive review of online learning in K-12 education, see Watson et al., "Keeping Pace with K-12 Digital Learning."

42 Radford, "Learning at a Distance."

43 See the CompetencyWorks website for recent definitions of competency-based education in K-12, http://www.competencyworks.org. The US Department of Education's efforts to describe the competency-based learning in both K-12 and higher education can be found here: http://www.ed.gov/oii-news/competency-based-learning-or-personalized-learning. A variety of reports on competency-based education can be found at http://www.inacol.org/resources/publications/competency-education/ and http://cbeinfo.org/.

44 Tyack and Cuban, *Tinkering Toward Utopia*, 93.

45 Sawyer, "Optimising Learning," 9.

46 Boston Day and Evening also allows students to enroll in September, March, or June. The school generally refers to its 317 competencies as "benchmarks," but the term has been replaced here for consistency.

47 South Carolina Education Oversight Committee, "A Review of South Carolina's K-12 Public Education Laws."

48 Education Commission on the States, "Number of Instructional Days/Hours in the School Year."

49 iNACOL, "Fast Facts." Funding formulas are different in all fifty states, with some states funding online learning at half the level of traditional education.

50 Education Commission on the States and the National Center for Time and Learning, "A State Policymaker's Guide to Expanded Learning Time."

51 The key, research suggests, is ensuring that time is used effectively to both engage and challenge students. See, for example, Charles Fisher and David Berliner, "Perspectives on Instructional Time"; Nancy Karweit, "Time-on-Task: A Research Review"; and Theodore Sizer, *Horace's Compromise.*

ENDNOTES

52 Although Adams 50's students still perform below state averages on Colorado's statewide tests, they have shown steady improvements since 2010 and, as a result, were removed from turnaround status in 2012. When third-grade reading results rose for the fourth consecutive year in 2014, Superintendent Pamela Swanson credited the competency-based model: "We still have a lot of work ahead of us, but four consecutive years of growth show that our requirement that every child fully understand a learning target before moving to the next level was the right decision for our children." See http://www.adams50.org/Page/5017.

53 New Hampshire is the only state that prohibits the use of time-based credits statewide. Several other states provide flexibility for districts to decide whether to use traditional credits or another measure of student learning. In Oregon, Washington, Iowa, Utah, Vermont, Minnesota, and several other states, districts can eschew time entirely, replacing traditional credits with competency-based measures of student learning at their discretion. And in states like Ohio, South Carolina, and Louisiana, districts can apply for waivers to be exempted from state requirements related to seat-time, credit definitions, and school calendars.

54 Pennsylvania Department of Education, "Awarding Credit to Support Student Learning," 8.

55 US Department of Education, "Digest of Education Statistics." As of Fall 2012, there were 4,726 degree-granting institutions.

56 College Board, "Trends in College Pricing: 2014."

57 National Archives, "Department of Education: Program Integrity Issues."

58 Ibid.

59 Fain, "Experimental College's First Graduate."

60 Bergeron, "US Department of Education Dear Colleague Letter."

61 Paul LeBlanc, interview with the authors, March 2013.

62 Silvernail et al., "Implementation of a Proficiency-Based Diploma System in Maine."

63 American Association of State Colleges and Universities, "Northern Arizona University Description of Competency Reports."

64 Maine Department of Education, "The Logical Next Step."

65 WGU uses a "disaggregated" faculty model. The range of traditional faculty tasks is divvied up among a number of staff including subject matter experts, assessment experts, and student coaches and mentors.

66 Srikant Vasan, interview with the authors, April 2013.

67 John Ebersole, e-mail message to the authors, February 2014.

68 Rose Colby, interview with the authors, April 2013.

69 The State Board of Education adopted Ohio's Credit Flex plan in March 2009, allowing for phase-in during the 2009-10 school year. Local education agencies were required to comply with provisions of the plan by the beginning of the 2010-11 school year.

70 At that time, while there were 1.5 million students enrolled in college, there were more than one million additional students enrolled in part-time, vocational, or adult education of some kind. Roughly one-third was enrolled in university extension courses. See President and Fellows of Harvard College, *General Education*.

71 Carnegie Commission, *A Digest of Reports*.

ENDNOTES

72 According to The College Board, students who receive credit through CLEP have higher GPAs than non-CLEP students, take more advanced courses in the tested subject, and are more likely to earn a degree within seven years. See http://clep.collegeboard.org/research/statistics.

73 The only public college in New Jersey to offer degrees at the associate, baccalaureate, and graduate levels, Edison offers full-time students the opportunity to earn up to thirty-six credits a year for a flat fee of $5,500 a year for New Jersey residents and $8,100 a year for non-residents.

74 Marc Singer, interview with the authors, June 2013.

75 Ibid.

76 Klein-Collins, *Fueling the Race*.

77 Council for Adult and Experiential Learning, "Underserved Students."

78 Higher Education Act, Title IV, Section 668.8. Also see Bergeron, "Dear Colleague Letter."

79 Reid Kisling, interview with the authors, March 2014.

80 Kathleen Massey, interview with the authors, June 2014. Carnegie's pension fund was also open to institutions in Canada and Newfoundland. Leaders from two Canadian institutions, McGill University and the University of Toronto, were among the members of the Foundation's first board of trustees, and both institutions were among the first to participate in the pension fund. Like the US, Canada ties the awarding and funding of credit to the Carnegie Unit. Canadian provinces are, like US states, experimenting with alternatives such as Alberta's High School Flexibility Enhancement Pilot. See http://ideas.education.alberta.ca/media/78910/hsepp_report_2013final.pdf.

81 Lee Shulman, interview with the authors, March 2013.

82 Peter Ewell, interview with the authors, April 2013.

83 The students claimed that they were denied access to the same opportunity to learn as students in wealthier schools because poor quality teachers were allowed to remain in their schools and classrooms. Although teachers, and specifically teacher tenure laws, were the

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subject of the trial and ruling, the legal framework of the case rested on the basic protection of equal rights, including the amount of time students spend in school. See American Civil Liberties Union Foundation of Southern California and Public Counsel Law Center, May 14, 2014, https://www.aclusocal.org/wp-content/uploads/2014/05/Complaint.pdf.

84 The US Department of Education announced its Experimental Sites Initiative in 2014 as a way to learn more about flexibility in aid disbursement. This includes experiments for direct assessment, competency-based education and prior learning. See https://experimentalsites.ed.gov/exp/approved.html.

85 House Bill H.R.3136 - Advancing Competency-Based Education Demonstration Project Act of 2014. https://www.congress.gov/bill/113th-congress/house-bill/3136. Accessed December 10, 2014.

86 Some institutions are already using strategies similar to Carnegie's. For example, two systems of higher education and eighteen individual colleges and universities are working together to study the quality and scalability of competency-based education as part of a Lumina Foundation-funded Competency Based Education Network. Network participants include the Kentucky Community and Technical College System, the University of Wisconsin Extension system, Antioch University, Argosy University, Brandman University, Broward College, Capella University, Charter Oak State College, City University of Seattle, DePaul University, Excelsior College, Lipscomb University, Northern Arizona University, Salt Lake Community College, Southern New Hampshire University, South Texas College, Texas A&M University at Commerce, the University of Maine at Presque Isle, the University of Maryland University College, and Westminster College.

And the thirteen public schools in the New England Network for Personalization and Performance are testing a potential shift to performance-based standards and assessments. The network was created by a partnership of the Plymouth, Massachusetts School District and the Center for Secondary School Redesign. The New York Performance Standards Consortium and the UCLA School Management Program are also partners.

APPENDICES

I. IMPROVEMENT SCIENCE PRINCIPLES

Carnegie is developing and promoting a research and development infrastructure that allows the Foundation to cull and synthesize the best of what we know from scholarship and practice, rapidly develop and test prospective improvements, deploy what we learn about what works in schools and classrooms, and add to our knowledge to continuously improve the performance of the system. The model is built on six core principles: [i]

THE SIX IMPROVEMENT PRINCIPLES

1. Make the work problem-specific and user-centered.

Quality improvement starts with a single question: "What specifically is the problem we are trying to solve?" It enlivens a codevelopment orientation. Engage key participants as problem definers and problem solvers from the earliest phases of development through large-scale implementation.

2. Focus on variation in performance.

A networked improvement community aims to advance efficacy reliably at scale. Identifying and addressing the sources of variability in outcomes is essential. Rather than documenting simply "what works," as in estimating an on-average effect, aim to learn "what works, for whom, and under what set of conditions." Develop the know-how to make innovations succeed for different students across varied educational contexts.

3. See the system that produces the current outcomes.

It is hard to improve a system if you do not fully understand how it currently operates to produce its results. Seek to understand better how local conditions shape work processes and resulting outcomes. Use this analysis to explicate a working theory of improvement that can be tested against evidence and further developed from what is learned as you go.

4. We cannot improve at scale what we cannot measure.

Measure outcomes, key drivers, and change ideas so you can continuously test the working theory and learn whether specific changes actually represent an improvement. Constantly ask, "Are the intended changes actually occurring? Do they link to changes in related drivers and to desired system outcomes?" Anticipate and measure for unintended consequences too.

5. Use disciplined inquiry to drive improvement.

Common inquiry protocols and evidentiary standards guide the diverse efforts of NICs. Engage in systematic tests of change to learn fast, fail fast, and improve fast. Remember that failure is not a problem; not learning from failure is. Accumulate the practical knowledge that grows out of failure, and build on it systematically over time.

6. Accelerate learning through networked communities.

NICs aim to break down silos of practice and research. **They reflect a belief that** we can accomplish more together than even the best of us can accomplish alone. A shared working theory, common measures, and communication mechanisms anchor collective problem solving. Organize as an NIC to innovate, test, and spread effective practices sooner and faster.

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[i] See Anthony S. Bryk, Louis Gomez, Alicia Grunow, and Paul LeMahieu, *Improving: Helping Our Schools Get Better at Getting Better* (Cambridge: Harvard Education Press, March, 2015).

APPENDICES

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II. CARNEGIE FOUNDATION FOR THE ADVANCEMENT OF TEACHING BOARD OF TRUSTEES

APPENDICES

III. CARNEGIE UNIT ADVISORY COMMITTEE

Chris Bustamante, President, Rio Salado Community College

Cory Curl, Senior Fellow, Achieve

Linda Darling-Hammond, Professor of Education, Stanford University

Joseph DiMartino, President, Center for Secondary School Redesign

Nicholas Donohue, President & CEO, Nellie Mae Education Foundation

Ronni Ephraim, Chief Academic Officer, 2U

Peter Ewell, Vice President, National Center for Higher Education Management Systems

Akili Moses Israel, Executive Director, Diploma Plus, Inc.

Sally Johnstone, Vice President of Academic Achievement, Western Governors University

Norman Jones, Professor of History and Director of General Education, Utah State University

Cathrael Kazin, Chief Academic Officer, College for America, Southern New Hampshire University

Amy Laitinen, Deputy Director for Higher Education, New America Foundation

Matthew Lewis, Senior Research Scientist, RAND Corporation

Dale Marsden, Superintendent, San Bernardino City Unified School District

Javier Miyares, President, University of Maryland University College

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David Schejbal, Dean, University of Wisconsin Extension, CEOEL Division

Carol Schneider, President, Association of American Colleges and Universities

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