



**Carnegie Foundation** for the Advancement of Teaching

**WORKING TOGETHER  
TOWARD STRONGER INSTITUTIONS  
AND STUDENT SUCCESS**

ANTHONY S. BRYK

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## Working Together Toward Stronger Institutions and Student Success

Thank you, Roberto. And thank you to ACCT's leadership and its president, Noah Brown, for the invitation to speak with you this afternoon. Today is a very special occasion. It is the first time in Carnegie's 100-plus year history that its president has had the opportunity to address the trustees of our nation's community colleges. It is with great pleasure and much appreciation that I join you today.

We live in extraordinary times. Our nation now asks much more of our educational institutions than ever before. All of our educational institutions are under intense scrutiny. Never before have the expectations been so high. Community colleges are now rightly seen as the front line for the American dream of self-betterment through education. The education of almost half of our nation's postsecondary students are your responsibility. You are charged with providing a gateway to opportunity for the poor, minority, and students from families where neither mom nor dad has had a college education.

Your efforts are now a highly visible part in a larger narrative.

All across this land we want all of our educational institutions to be more effective—more ambitious academic outcomes for many more students. We also want them to be more engaging and responsive to diverse interests and needs of students who might enter our doorways. For, far too many students walk out these doors and never return. And, we want our schools and colleges to be more efficient in use of resources, as public funding is highly stressed and likely to remain so for some time to come. Advancing any one of these goals would be ambitious; moving simultaneously on all three—the Triple Aims of Education Improvement—is unprecedented.

**Let me tell you a bit about us—the Carnegie Foundation.**

During its more than 100-year history, Carnegie has been a catalyst for institution building in education. Back in the day when faculty at colleges lacked a retirement system, the Carnegie Foundation brought the first educational pension system, TIAA ... later TIAA-CREF ... into existence.

It has focused on improving professional education including work that dramatically changed the preparation of doctors.

It sought to advance fairer ways to admit students to college and universities which led to the founding of the Educational Testing Service.

It did ground breaking work on federal higher education policy, which eventually led to Pell Grants for student financial aid.

And my predecessor, Lee Shulman, nurtured the emergence of a scholarship of teaching and learning where faculty members systematically study their own instruction in efforts to improve.

To this day, we remain a small operating foundation not to be confused with our much larger, and much better endowed sibling, the Carnegie Corporation of New York. Regardless, Carnegie Foundation remains a most unusual organization.

With each new president, the Foundation takes up a new challenge. To fulfill Andrew Carnegie's original charge to us—to use well his private philanthropy to advance the public good—we must pick our tasks extremely carefully, as we can only do a small number of things at any one time. That is why standing here today is especially significant for me.

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The Foundation Board has embraced my recommendation that we commit ourselves to further advance student success in community colleges. Personally, I can think of no more important issue demanding our attention, and the Foundation board has agreed. This is Carnegie's new mission for these times.

### **Let me tell you a bit about myself, what led me to this point.**

Neither of my parents had the benefits of even a high school education. But they knew that education mattered and they both labored throughout their lives to assure I would get a good education so that "I would not have to work hard like them." For me, learning math, learning statistics, became a gateway to opportunity.

For almost 20 years before moving to the west coast, I lived in Chicago and worked with teachers, principals, school community leaders, heads of colleges, businesses and foundations, all of whom were seeking to improve educational opportunities in one of our nation's most disadvantaged public education system. Our shared goal then was to keep students in school long enough to get them to your doorsteps.

As I moved to Carnegie, I quickly learned that access to higher education was really only the first step. Student success in college was the real hurdle. Let me illustrate.

A typical cohort of 13-year-olds in the city of Chicago consists of approximately 40,000 students. About 60 percent of them will eventually graduate high school. The rest will not. The better prepared among the graduates will go on to enroll in post-secondary education, many in community colleges. So even before Chicago students got into college, the majority of their classmates would have already been culled out. Upwards of 80 percent of the "successful" high

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school students who actually enrolled in college would subsequently be tracked into developmental mathematics and upwards of 80 percent would never get out. For far too many students, developmental math is where aspirations for a better life through education comes to an end.

Looking nationally, a “back of the envelope” calculation indicates that over two million students who entered community college in fall 2008 never completed a college-level math course. For these students, life and career goals are thwarted—a circumstance with dire consequences for them as individuals and for our society.

I believe we must do better and working together. I am sure we can.

### **How is Carnegie working on this?**

As I began as Foundation president in 2008 it seemed inconceivable to me how we could advance the Triple Aims of Improvement without a much more vibrant research enterprise focused on what really matters—teaching and learning. The problems we confront today are not about individual competence or effort; in the main, faculty and staff in community colleges are very good people and they are already working quite hard.

But, they live and work in what has become a large and very complex system, a system that regularly produces results that often no one intends and sometimes do not even see.

So it is not a need for more or better people. Instead, we need smarter systems, organizations capable of learning and improving, that see learning and change as what it means to be vital, to be alive.

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To be clear, we are not about some ivory tower enterprise where a select group of academics talk to others like themselves, speaking and writing in ways that few others can understand. Rather, we aim to put the day-to-day work of educators at the center of our activity. We focus on solving practical problems that have genuine consequences for peoples' lives.

We organize around measureable targets for what we specifically seek to accomplish and use such data to hold ourselves accountable. As an immediate goal, we aim to double the rate of students who are able to earn college-level math credit within one year of continuous enrollment. We now know that the baseline in our network colleges is only 5 percent. Doubling that in two years seems imminently feasible. With a bit more time, we see no reason why a target of 50 percent is attainable.

In collaboration with faculty, institutional researchers, academic leaders, instructional designers, technologist and other academic experts, we are now forming what we have come to call **networked communities engaged in improvement research** toward these targets.

This work challenges us in a variety of new ways. First, we need to analyze the **system that is producing the current outcomes. It is hard to improve what you do not fully understand.**

Failure rates in developmental math are an aggregate consequence of numerous processes working together. We won't be able to directly improve student success until we can decompose this big presenting problem into its component processes and then analyze the interconnections among them. By way of an industrial analogy, you can't just stand at the end

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of the assembly line and lament the amount and quality coming off the end of the line. You have to go back up the line, look and see all the processes that are influencing these outcomes, and the organizational factors that in turn shape these processes. These become the specific foci for improvement and must be measured. This represents **our second organizing principal: you cannot improve at scale what you cannot measure.**

Third, we need to rethink how we innovate. As educators, we are pragmatists. We see problems and we want to move quickly to solutions. But we also know from past experience that many solutions are rarely tested against evidence and we rarely rely on evidence to continuously improve them. We tend to put new programs in place and then move on.

We challenge this way of working. We know from 50 years of history at educational innovation—few things actually work as originally designed. That failures may occur is not the problem; that we fail to learn from them is.

In response, **our networks embrace a quality improvement orientation.** We encourage rapid cycles of changes. If something doesn't work, change it until we find something that does. This entails a mind shift from seeing change as principally about managing the dynamics of largescale roll out toward seeing change as opportunities to learn to improve. This learning from practice to improve is the surest mechanism for success.

Fourth, educators are accustomed as a field, and dare I say we are most comfortable, working in our separate silos—our individual classrooms, departments and colleges. We tend to believe that if “it is not invented here, it cannot be any good.” This ethic too needs to be challenged.

**Our networked communities embrace the wisdom of crowds.** We know that we can accomplish more working together, learning together, than even the best of us can accomplish alone.

These are the core ideas that undergird the efforts of the networked improvement communities that Carnegie is helping to initiate, seeks to advance their growth, and assist over time toward self-guidance. This is in the tradition of the Carnegie Foundation—institution building for improvement.

**Next, I would like to tell you a bit more about our specific problem focus—  
Developmental Math as Gateway rather than Gatekeeper to Opportunity.**

**Math matters to us as a nation.** As Anthony Carnevale, director of the Center on Education and the Workforce writes:

“If educators cannot fulfill their economic mission to help our youth and adults achieve quantitative literacy levels that will allow them to become successful workers, they also will fail in their cultural and political missions to create good neighbors and good citizens.”

**And it matters to us as individuals.** As Carnevale also notes: “those who get the best jobs have taken the most mathematics.”

For decades, we have been laboring under the idea that we need to press more students on the pathway to calculus. Yet few careers actually make use of this mathematics (outside of engineering and select sciences) and it has virtually no relevance in students’ personal and civic lives.

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The Carnegie Pathways instead focus on the mathematics that matters for work, for personal living in an increasingly quantitative age, and to be an informed citizen, critically engaging issues of our public life together.

In response, **our two networks are anchored respectively in statistics, which we call Statway, and a second in quantitative literacy, which we call Quantway.** Both aim to get students to and through college-level math in one year. These communities bring together community college faculty and administrators as well as education researchers and program designers to develop, implement and refine each pathway.

These pathways are very different from what students have typically experienced in the past.

We have ample evidence teaching students the same content over and over again in the same way just doesn't work. Students who failed to learn the basics of ratios/fractions and proportions in elementary school, and who did not benefit from attempts to re-teach it the same way in middle and high schools, are very unlikely to learn this material if presented it in the same fashion still one more time in community colleges.

To provide a grounded comparison, for example, between Quantway and a typical developmental algebra course, you merely have to compare syllabi. The lessons in the first module of our developmental Quantway sequence have titles such as "Seven Billion and Counting," "The Credit Crunch," and "Has the Minimum Wage Kept Up?" These are problems based in the mathematics of algebra but centered around the themes of citizenship, personal finance and medical fluency.

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Compare this with typical chapter titles in an intermediate algebra text such as “Inequalities,” and “Exponents and Polynomials.”

A bit of a test: How many of you in the last couple of weeks factored trinomial or solved simultaneous quadratic equations?

How many of you may have looked at some statistical data, charts, graphs, situations where you are being asked to make sense, make some reasonable causal inferences based on these data?

What about financial literacy? Tried to make sense of a credit card statement or compare perhaps different mortgage refinancing options?

See my point? Quantitative literacy, the use of statistical data for making decisions under situations of uncertainty, is the mathematics of everyday life, the math that matters. What our students need is not more complex math content, but rather to learn how to use math well in the complex problems we confront at work, in our personal lives, and in exercising our civic responsibilities.

Our daily lives rarely live “in the proportion chapter” where we apply over and over again the same specific algorithm for manipulating proportions. To be sure students need facility in these arithmetic operations; but they also need to know which skills to apply when given the problem in front of them. So the pathways are about **math that matters**.

**Second, we are attending more to how students learn.** In truth, we now know a lot about how students learn, but this knowledge is used at best only sporadically in design of instruction and teaching. Drawing on findings in cognitive science and learning theory research,

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lessons are built around rich problems where students are asked to think, struggle with ideas and then in this context come to see how basic tools of algebra, statistics, data visualizations and analysis can help them understand better. Such instruction constantly seeks to make explicit connections about both the big ideas of mathematics as well as the specific tools that we might apply to different problems.

We also now know a lot more about the design of effective homework. There is much more to this than rote repetition of the same algorithms over and over again to a similar set of problems.

**Third, we also know that we must “see our students as persons,” attend closely to who they are, if we are to engage them and ultimately educate them.** Students placed in developmental math often come to the classroom with what Carnegie Senior Fellows Jim Stigler and Uri Treisman call “math scar tissue”—the residue of years of failure in mathematics courses. Many students have experienced schooling that says to them “you are not good at this, we don’t expect you to achieve.” But we now know from extensive research that math ability is in fact malleable; with effort and deliberate practice, new skills and understandings can be acquired. Yes, our students can indeed learn math, and even more importantly come to see its relevance in their lives.

Most students work hard in developmental math classes—studying long hours, nights and weekends—yet do so using ineffective strategies. Some simply withdraw effort soon after the course begins. Student success requires both persistence in studying and attendance and efficient and effective use of time and energy. We call this **productive persistence**—a third key

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driver for success in our pathways. A number of promising social psychological interventions are now being integrated into pathways instruction in seeking to make a difference here.

Fourth, we know that there are **language and literacy** barriers that impede instruction and learning. Let me describe this by example of a visit to a community college classroom. Most of the students in the classroom are immigrants whose first language is not English. The professor is also of immigrant background, although his first language is different from that of his students. Then there is the language of mathematics as the formal content for study and all of this is being carried out in English. This is a four-language problem. No wonder so many students struggle.

So in the design of our pathways and in the continuous improvement studies now underway with faculty, our networks are also attending to where the language of instruction, rather than the mathematics, is the real barrier to learning, and how this barrier may be manifest in textbooks, homework assignments, classroom lectures and discussion activities.

Fifth and finally, an innovative program of instruction is only as good as the **capacity of faculty to engage students around these materials**. The quality of teaching really matters. The good news is that community college faculty know their mathematics. However, most have had no formal pedagogical preparation to teach, especially in the ways that Statway and Quantway envision. We also expect to confront special challenges as increasing numbers of adjunct faculty get drawn into pathways teaching, as their lives are especially stressful. So learning how best to engage new faculty in our community—learning in their practice to improve it—renders our fifth driver—**Advancing Teaching**.

### **So, where are we now and what are we learning?**

We now have 30 colleges participating in our two networked improvement communities—22 in Statway and eight in Quantway. There are 1200 students enrolled in 60 sections of Statway, and Quantway goes live in classrooms beginning in January. Over 80 faculty are now network members, all of whom have participated in some fashion in co-developing the materials with us and are beginning to engage in improvement projects seeking quality at scale.

Uri Treisman, who will be visiting with you later in the week, has been a key thought partner in conceptualizing these pathways to success. His staff at the Dana Center at the University of Texas at Austin have collaborated in developing the pathway learning goals and in the initial instructional materials now being used by network faculties.

We've also joined with Carnegie Mellon's Open Learning Initiative. They are hosting the online platform, which includes homework, supporting out-of-class activities and student projects. We've created Carnegie Connections, our online faculty discussion forum, and staffed a helpdesk that is a 911-like resource. An agile continuous improvement team at Carnegie monitors daily reports from faculty and students as the curriculum is enacted so that we are able to undertake rapid improvement cycles as evidence warrants.

And there are general "housekeeping" accomplishments, things like securing data sharing agreements with all of our colleges in order to generate baseline reports on student success and finalizing transfer agreements for colleges and the primary four-year transfer institutions.

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While it is early on in the life of these networks, so far what we're hearing is most encouraging. From our student surveys, we know that a month into class, students say that they're finding that math and statistics are more interesting than the math they had before. They are less anxious and more likely now to believe that with hard work, they too can learn math.

Likewise faculty are working hard and they too are saying "hey, this is interesting stuff." Some who were doubtful when we first met 15 months ago, have actually stepped up as faculty leaders within these communities.

As one faculty member put it:

"All of my comfort zones are deeply threatened, but it is like the comfort zones were exactly what has been wrong. The whole system is set up to protect us from being challenged to improve... ."

While we have many miles to go and certainly many challenges to negotiate, we believe that an environment of transparency and trust has formed across the network. Faculty are sharing their struggles as well as their successes, and so are we.

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I know that as the pressures mount on all of us, there is a temptation to cast blame—we've seen it in K-12 and in other sectors. As we attempt to find a better way, it is natural to wonder about the institutions, or their leaders, or the faculty, or to think that the students "just aren't what they use to be."

What is needed now is not a community of blame, but rather a community of learning, learning to improve. We know too well that broad scale instructional improvement cannot be

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legislated from the outside. We also know that real educational accountability only arises when we as educators take up the challenge, when we own the problem.

The steady and sure solution is for faculty and institutional leaders to take ownership for sustained improvement, to support the use of evidence as they work together to target problems of practice through innovations like our mathematics pathways. We know that working in networked communities, using the tools of improvement science can work. We have seen this work in other sectors as diverse as industrial manufacturing and health and social service agencies. It can work for us too.

As an ACCT leader, you are already engaged in a community that is dedicated to promoting student success and completion. I invite you to become advocates at your institutions and in this larger community for the ideas that I have briefly introduced this afternoon. **I believe that working in network together we can learn to improve;** we can aspire and in fact achieve much greater success. Together we can build stronger institutions where faculty and students achieve the kind of success that will honor the missions you embrace.

In closing, I want to thank you again for this opportunity to address you this afternoon. I commend your efforts and commitment confronting the difficult roles you have freely chosen to take on. Resources are scarce and the accountability demands have never been greater. You are communicators, advocates and resources for your institutions. Rarely do we publicly acknowledge and thank you for all you do day in and day out. Your leadership in the face of these pressures is a most valued civic resource in these extraordinary times in which we live.

I congratulate you!

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Carnegie Foundation for the Advancement of Teaching is an operating foundation located in Stanford, California. Founded by Andrew Carnegie and chartered by Congress in 1906, the Foundation has carried out a diverse program of activities to support and advance the work of educators. The Foundation has contributed influential policy reports addressing educational quality, access, and assessment; initiated the Teachers Insurance Annuity Association of America (TIAA, now TIAA-CREF); authored the Flexner Report that changed medical education in America and beyond; founded Educational Testing Service; and established the Carnegie Classifications of Institutions of Higher Education. Carnegie Foundation has also led efforts to provide federal aid for higher education (Pell Grants), and advocated for scholarship on teaching and learning.

Today, the Foundation seeks to pioneer a radically different model of educational research and development, one capable of advancing improvements in student learning at scale. We are engaged in a deep and long-term exploration of the application of the tenets, tools, and methods of improvement research in education. We are initiating Networked Improvement Communities, comprised of practitioners, administrators, researchers, designers, developers, and students, applying these diverse perspectives and talents to address high leverage problems of practice in the local contexts that define them. Each is supported by a resource hub at Carnegie that provides substantive, technical, methodological, analytic, and facilitative expertise.

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Carnegie Foundation for the Advancement of Teaching  
51 Vista Lane  
Stanford, California 94305  
650-566-5100

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