Our Own Worst Enemies

Regulations and Policies Affecting the Transfer of Credit between Two- and Four-year Institutions

by Ken O'Donnell
Senior Director, Student Engagement
California State University Office of the Chancellor

Like the committee that requested it, this report takes the need for more STEM graduates as an article of faith. Evidence on this question is inconclusive: wages among science and engineering graduates are rising no faster than anyone else's, and unemployment – resulting from mismatches between training and employer need – is also comparable. On purely economic grounds, there may not be a shortage. (For a good but controversial summary of the current thinking, see Robert Charette's "The STEM Crisis is a Myth" in IEEE *Spectrum*, August, 2013).

Yet current employment data don't tell the whole story. For one, the country's civic health would benefit if more Americans understood mathematical, scientific, and technical reasoning. For another, macroeconomic figures are trailing indicators in a sector where change comes especially quickly. STEM defies the command economy: rapidly evolving industries work best when individuals have maximum information and discretion to make their own choices, and by that standard STEM education is falling short.

The majority of students who begin college wanting a degree in science, technology, engineering and math either switch to something else or don't graduate at all (PCAST, 2012). In other words, they leave with neither the information nor the choices they came in wanting, and that reduces the flexibility and responsiveness of the national economy as a whole. Attrition is steepest among the populations that higher education is often hardest pressed to serve: ethnic minorities, those eligible for financial aid, and those whose parents didn't attend college.

The fact is if people want STEM degrees then they should have a reasonable and equitable shot at earning them, and today that isn't the case.

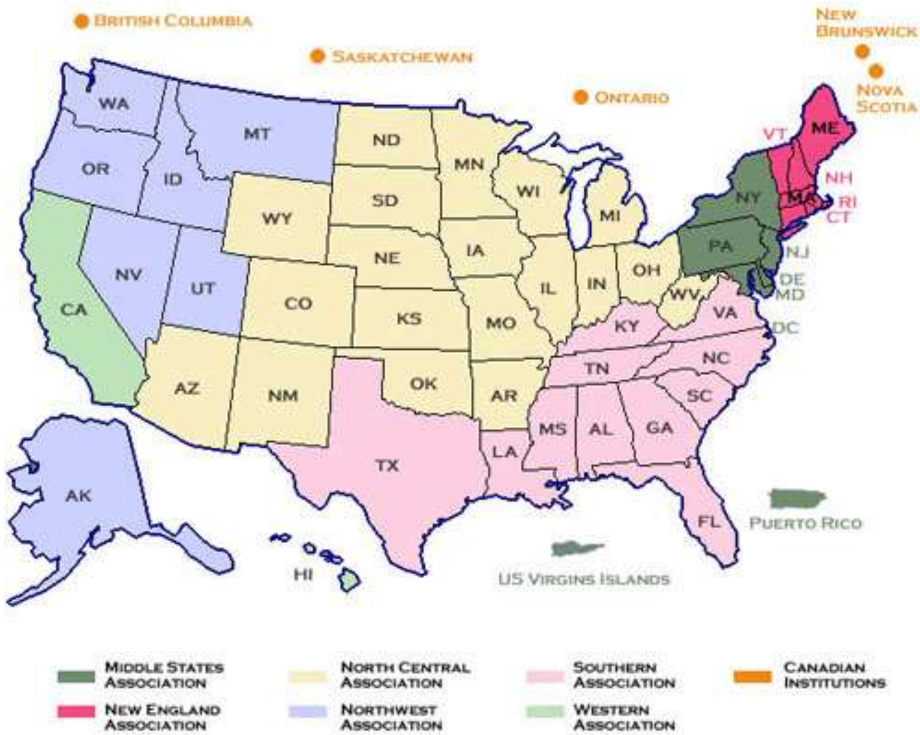
Weaknesses can be found throughout the educational ecosystem, even in obscure areas like the subject of this report, transfer credit. And because at-risk groups are likelier to begin earning degrees at community colleges, improving articulation is key to both our ability to add to STEM graduates, and our prospects for closing STEM achievement gaps.

Articulation Policy at National, State, and Local Levels

Overlapping jurisdictions complicate an already arcane topic.

At the broadest level, the U.S. Department of Education influences higher education by the outsized role of federal financial aid, without which few colleges or universities could survive. Pell Grants and Stafford Loans are effectively vouchers, in which the money follows the student rather than the institution. In order to matriculate those students – to cash the checks – public and private institutions alike need approval from one of seven U.S. regional accreditors. (See figure 1.)

Figure 1 U.S. Regional Accreditors of Higher Education



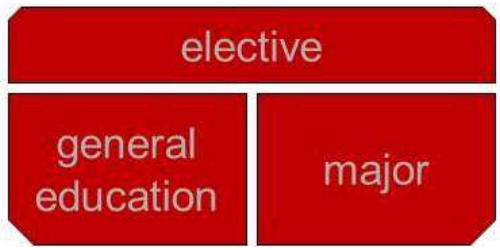
(image credit: National Survey of Student Engagement)

The institutions that win regional accreditation agree to recognize each other's degrees and courses in transfer. Such recognition is prized nearly as much as the access to financial aid, and colleges and universities will work hard – and spend freely – to remain fully accredited. (See Paul Gaston, *Higher Education Accreditation: How It's Changing, Why It Must*, 2014.)

But this pooled approach to recognition comes with a risk: students who earn and transfer academic credit aimlessly may exhaust their financial aid eligibility before they earn a degree. What students need isn't just "credit" but degree-applicable credit, that is, credit that satisfies one or more parts of the curriculum required by the institution that will confer the degree.

Degree requirements can be grouped into one of three areas. (See Figure 2.) In the first are "major requirements," those that relate to a particular field of study. For example, students who choose a business major will probably need courses in management, accounting, and economics. In the second area are "general education requirements," such as writing, quantitative reasoning, and broad knowledge of the world and its natural and cultural workings – the learning we expect of all college graduates, regardless of major. Finally, all degrees require some minimum number of credits overall, typically 120 hours per week of instruction on a semester calendar, or four years of full-time study. On their own the first two areas, major and GE, may not add up to this number, so the student will also need some wild-card or "elective" credit.

Figure 2 Kinds of Academic Credit



Of these three areas of academic credit, "elective" is the easiest to transfer, and on its own will satisfy the requirements of reciprocity that are built into accreditation, and thus into federal financial aid.

But elective credit is also the least beneficial.

At this point state-level policies have more to say. In a sense their higher expectations for transferability are reasonable: states invest in both sides of the higher education transaction, awarding individual students with vouchers of their own (such as Cal Grants in California, or Bright Futures in Florida), and also underwriting their public colleges and universities on an institutional level.

With so much skin in the game, state governments feel justified in a more prescriptive approach to transfer credit policy.

At one extreme, some states have mandated common course numbering as a way to simplify articulation. So Biology 101 at a community college will be guaranteed to replace Biology 101 at a public university, meeting requirements not only for elective credit but also for credit in the major and/or general education. This has appeal for the public and policy makers, because it circumvents local decisions about how prior coursework should satisfy local degree requirements.

Without common course numbering, those local decisions can suffer from a conflict of interest. Many departments and programs are funded on an enrollment basis, and for them every decision to recognize prior learning instead of requiring a course comes at a price. Proponents of common course numbering cite abuses in which students were compelled to take courses in subjects they already knew.

But common course numbering has drawbacks, with direct bearing on the nation's ability to produce STEM graduates. First, it reduces college learning to a course-centric model, assuming that other sources of education, such as work experience, military training, and co-curricular participation, probably won't count.

Second, it puts the burden for consistency on inputs (courses) rather than on outputs (student proficiency). What should matter for the sake of transfer is what the student has already learned, and not how the student learned it. So for example, a student may come to a university as a junior proficient in writing, having drafted term papers for half a dozen courses in history and political science, but without a traditional course in freshman composition. Or a chemistry major may have studied organic and inorganic chemistry in three semesters instead of two. In both of these cases common course numbering would lead the receiving institution to make the wrong determination about transfer credit.

Finally and most significantly, institutions connected to each other with common course numbering have to innovate in step with each other. The engineering department that wants to try re-sequencing its prerequisites, or the math department testing an intervention like Statway, mixing traditional remediation with college-level coursework, must also talk their colleagues around the state into making the same experiments.

In fact, most states have developed policies around transfer and articulation that focus on degree requirements rather than course numbering. For example, many states have policies to recognize common packages of courses in lower-division general education requirements, that work no matter how the courses are named and numbered. Others have agreements that match two-year associate degrees to four-year baccalaureate degrees, in ways that guarantee admission for transfer students at the junior level.

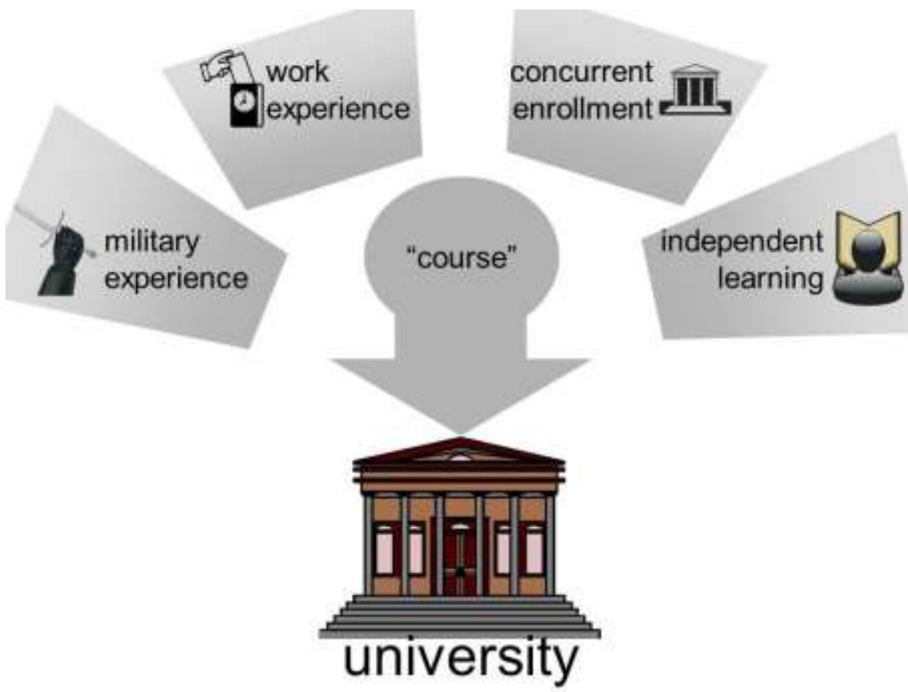
Because the environment is rapidly changing and complex, there are few authoritative efforts to compare comprehensive, state-by-state lists of regulations and policies. The American Association of State Colleges and Universities commissioned one such study in 2005, and the Center on Reinventing Public Education sponsored another study from 2008, also sometimes cited. The dearth of current compendiums suggests that regulation is only part of the story.

Other influences on articulation

The regulatory environment is affected by diverse jurisdictions, financial incentives, and conceptions of academic credit, but traffics in a common currency, the course-based credit hour. As a result, other influences – less explicit and less statutory – can easily work their way into the economy, and affect the transferability of credit.

The easiest way to turn prior learning into academic credit is by treating it like a traditional course, or in the parlance of registrars and evaluators, a "pseudo-course." Common examples include military training, work experience, and independent study (as illustrated in Figure 3).

Figure 3 Prior learning and academic credit



The critical conversion into recognizable, three-unit courses may be effected by externally developed tests, such as those offered by the College-Level Examination Program (CLEP), or by organizations like the Council for Adult and Experiential Learning. Often the conversion is made one student at a time, by a faculty advisor or department chair.

This easy conversion is an important safety valve in what can otherwise be an inflexible approach to transfer credit. For example, the recession of several years ago prompted many unemployed workers to return to school for retraining, at the same time that states had to reduce support for public institutions. Private institutions – both proprietary and non-profit – satisfied much of the unmet demand, and could do so because the credits transferred, so long as they enjoyed regional accreditation.

Similarly, the influence of disciplinary accreditors and professional associations, such as ABET for engineering, or ACS for chemistry, strikes most outsiders as salutary, a case of the experts calling the shots, and bringing curriculum along as knowledge evolves.

But in practice this apparent flexibility has little to do with transfer credit policy. The policy itself is founded on modularity and portability, the "course" as endlessly interchangeable part on the Eli Whitney model.

Innovation, and its impetus

A genuinely innovative approach is the "Interstate Passport," developed by states participating in the Western Interstate Commission on Higher Education. It foregrounds demonstrated student proficiency in three common areas of general education (written communication, oral communication, and quantitative reasoning), taking a first step toward leaving behind reductive course requirements altogether.

By de-emphasizing individual courses, receiving institutions can free up sending institutions (typically but not exclusively community colleges) to educate their students with more innovation and flexibility, responsive to local needs, populations, and expertise. This has a direct bearing on STEM: incoming students suffer from campus climates and institutional structures that frustrate engagement (Hurtado, 2013), particularly in the gateway courses that face the keenest pressure to homogenize for the sake of transfer.

Perhaps the most succinct and damning account of the status quo is offered in the 2012 report of the President's Council on Academics in Science and Technology:

> In the United States, fewer than 40% of the students who enter college with the intention of majoring in a STEM field complete a STEM degree. Most of the students who leave STEM fields switch to non-STEM majors after taking introductory science, math, and engineering courses.
>
> Many of the students who leave STEM majors are capable of the work, making the retention of students who express initial interest in STEM subjects an excellent group from which to draw some of the additional one million STEM graduates [called for elsewhere in the same report].
>
> Many students who transfer out of STEM majors perform well, but they describe the teaching methods and atmosphere in introductory STEM classes as ineffective and uninspiring.

The upshot: innovation is needed, and some well-intentioned articulation policies make innovation harder, not easier.

Yet the answer isn't to do away with policy: there is too much at stake in terms of student access, mobility, and learning to return to ad hoc articulation. STEM degree production would benefit not from fewer regulations but from better ones, informed by current thinking about how people learn, and what engages students as they enter college.

Connecting Students to Learning: High-Impact Practices

Decades of research suggest common elements in the most successful approaches to undergraduate education: effortful, purposeful work; quality interactions between students and faculty; high expectations and commensurate support; and varied opportunities for application that promote frequent feedback and, in the phrase of educational psychologist Diane Halpern, "multiple cues for retrieval." Examples include learning communities, service learning, undergraduate research, integrative capstone courses, and community engagement.

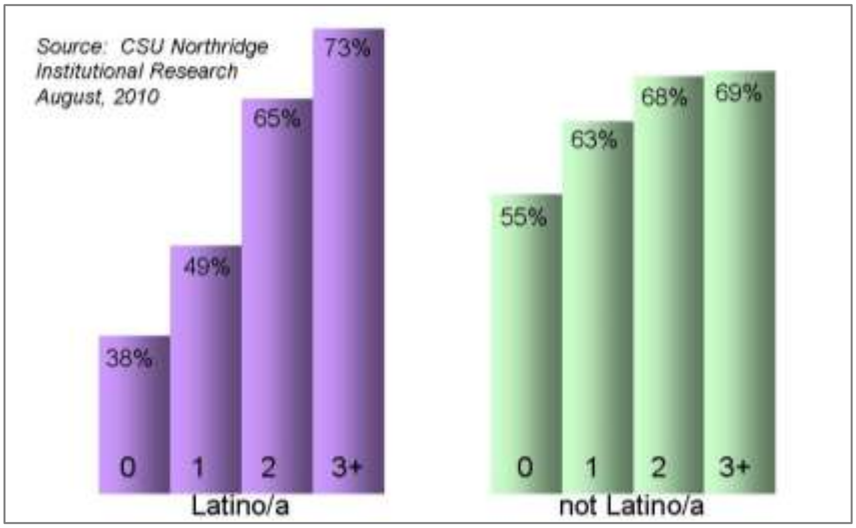
In a landmark 2008 publication, George Kuh identified the common elements of these disparate practices and grouped them as "high-impact practices." His innovation was in the grouping more than in the identification – some interventions, like learning communities, have been in place for decades. But by highlighting their similarities and joining them into a category, Kuh promoted a new level of research and implementation.

One example, from the office of Institutional Research at California State University, Northridge, has been widely shared. It shows a strong correlation between six-year graduation rates and student participation in multiple high-impact practices, with especially marked benefits for Latino students. (See Figure 4)

The application of this research in STEM settings could stanch the attrition described in the PCAST report, and produce more graduates in these fields without recruiting more freshmen. And because these practices are effective educationally, promoting experiential, contextualized learning that transfers across domains, the additional degrees would be of high quality. They would be likelier to carry the dispositional learning or "habits of mind" – such as resiliency, determination, and grit – that auger continued learning and success after graduation.

One challenge to broader implementation of high-impact practices is their status as auxiliary to the formal curriculum. Degree requirements, like transfer credits, are measured in traditional courses, assuming a lecture delivery and a content emphasis.

Figure 4 CSUN Six-Year graduation rates by student ethnicity and self-reported number of participations in high-impact practices



Source: California State University, Northridge

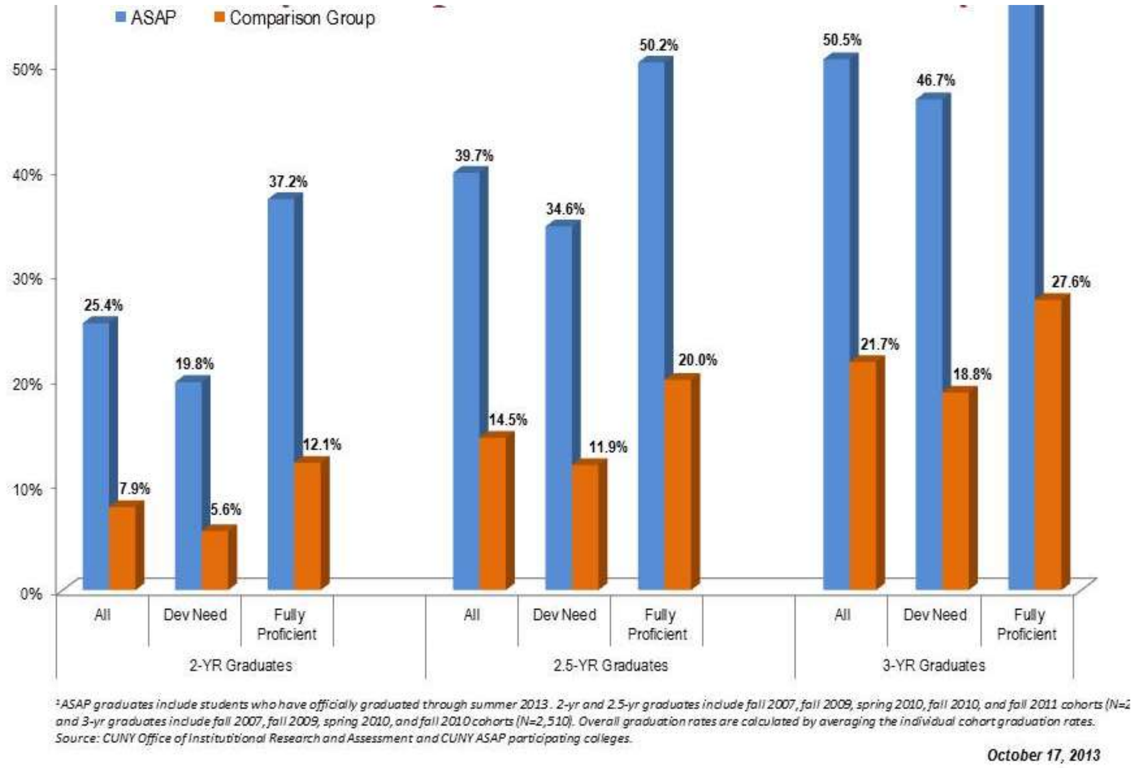
Newer educational practices are relegated to voluntary participation, and the research shows that the very same at-risk students who most stand to benefit are also the least likely to opt in (Kuh, 2008). This may be truest at the community colleges, where students are notoriously pressed for time; in the words of Kay McClenney, director of the Community College Survey of Student Engagement, "community college students don't do optional."

With this in mind, many programs nationally have begun building high-impact practices into the lower division for all students, elevating them to graduation requirements in both the universities and, prior to transfer, in community colleges. Most are in private institutions, whose selectivity, mission, and institutional savvy bring success within reach.

Two programs are of particular note for their emergence in public, access-oriented institutions, where STEM graduation rates are chronically worse.

The ASAP program at City University of New York uses intrusive advising, a cohort based learning community, and clear curricular pathways for specific majors to create an environment with few options. Students don't select individual courses but entire programs, and commit to full-time enrollment and limited off-campus employment for a two-year run. Preliminary persistence results are encouraging (see Figure 5), across the entire spectrum of college readiness.

Figure 5 Average graduation rates of ASAP and a comparison cohort by developmental need at time of entry

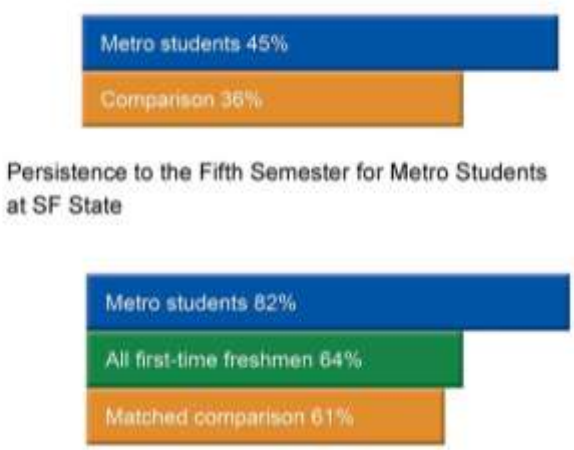


Similar benefits to the cohort approach are apparent in California at the Metro Academy Initiative, a collaboration between City College of San Francisco and San Francisco State University. As at ASAP, the students at Metro register for whole sets of courses, taken as a group over two years in what the program designers call a "long-duration learning community."

Intellectual skills in general education, such as writing and quantitative reasoning, are intentionally embedded and repeatedly practiced in lower-division general education coursework. Metro STEM GE courses are contextualized with the broad theme of "Science for the Public Good." STEM students write, speak and research about the contributions science makes to personal, social and environmental health, making learning engaged and relevant to their science interests. As a result, Metro students are less likely to ask "why do I need this course?" and are also much less likely to drop out. (See Figure 6)

Significantly, both Metro and CUNY have commissioned independent research into the cost-effectiveness of their approach. MDRC evaluated ASAP and found that additional program costs are more than offset by improved success rates; in terms of dollars per completion, the city of New York is spending less on ASAP than with traditional, lighter weight delivery.

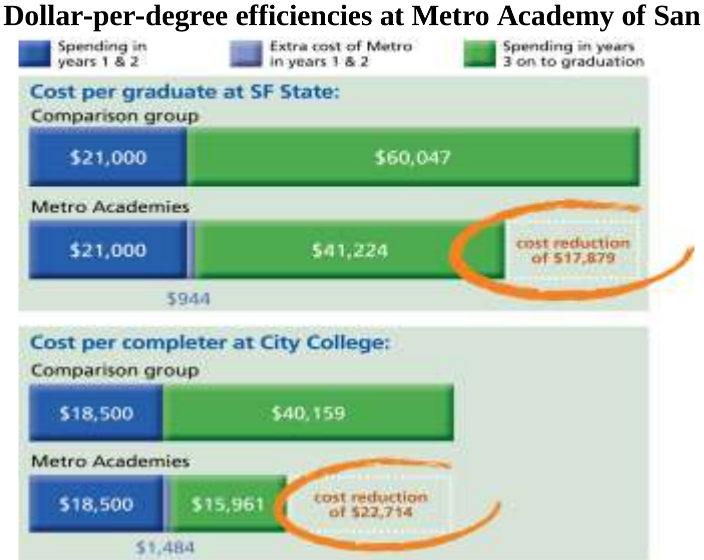
Figure 6 Projected achievement to 60 units for metro students at City College



The same conclusion was reached for Metro by Rob Johnstone of the Research and Planning Group, seconded by Jane Wellman of the Delta Cost Project (see Figure 7), and additional details at metroacademies.org/cost-efficiency/.

Results like these are convincing in part because they confirm what most educators have learned from first-hand experience: the social dimension of education matters, and at-risk students particularly welcome the clarity of constrained choice, intentionally designed curriculum, and mutual commitment.

Figure 7 Dollar-per-degree efficiencies at Metro Academy of San Francisco



Toward a Synthesis: High-Impact Practices and Stronger Articulation for STEM

At the state and national level, emerging work seeks to reconcile the demands of access and mobility on one side – that is, articulation – with the principles of engaged learning and student success on the other. Traditional transfer policy – like the transcript it's founded on – is blind to the innovations like learning communities, applied research experiences, and community engagement that can bring STEM learning to life.

One problem to address in the short term: weak definitions of the high-impact practices most conducive to STEM disciplines. Before registrars and evaluators can build them into degree requirements, faculty at colleges and universities need a shared, unambiguous understanding of what exactly these practices are, and what they aren't.

Two interventions in particular – summer bridge and first-year experience – seem ripe for such development. Their benefits for students are well known, and their application in STEM settings should lead to measurable improvement in degree production, particular among at-risk populations, who leave the major right away. But their universal adoption depends on requiring them of all students, regardless of STEM discipline or institution of origin, rather than letting individual students opt in on a local basis.

To that end, the California State University is piloting "STEM Collaboratives" across its 23-campus system of regional comprehensive universities. Each one will integrate a STEM-focused summer bridge, first-year experience, and gateway course redesign, all geared toward retaining STEM majors at entry who are most prone to dropping out or switching majors. The project has a robust research and evaluation component, so that administrators can see which elements are most significant, and cost-effective, and therefore worth building as requirements into policies of transfer and articulation.

The research is early, but could help educators in all states learn how credit policies might become friendlier to the goal of STEM degree production, and no longer our own worst enemies.