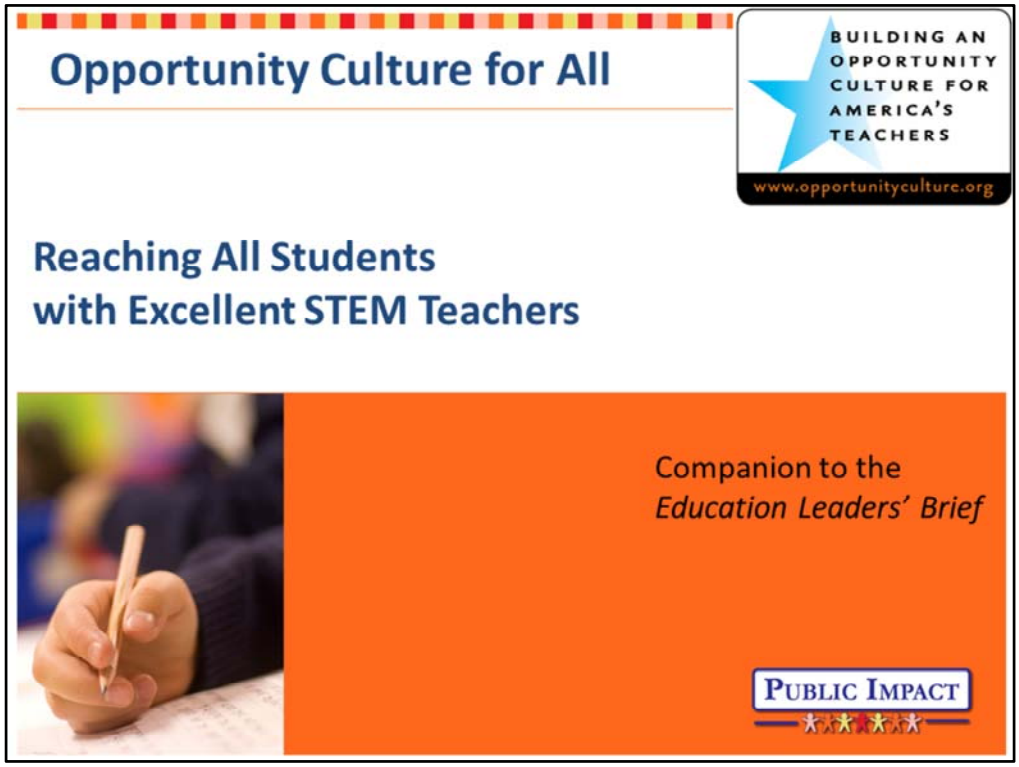
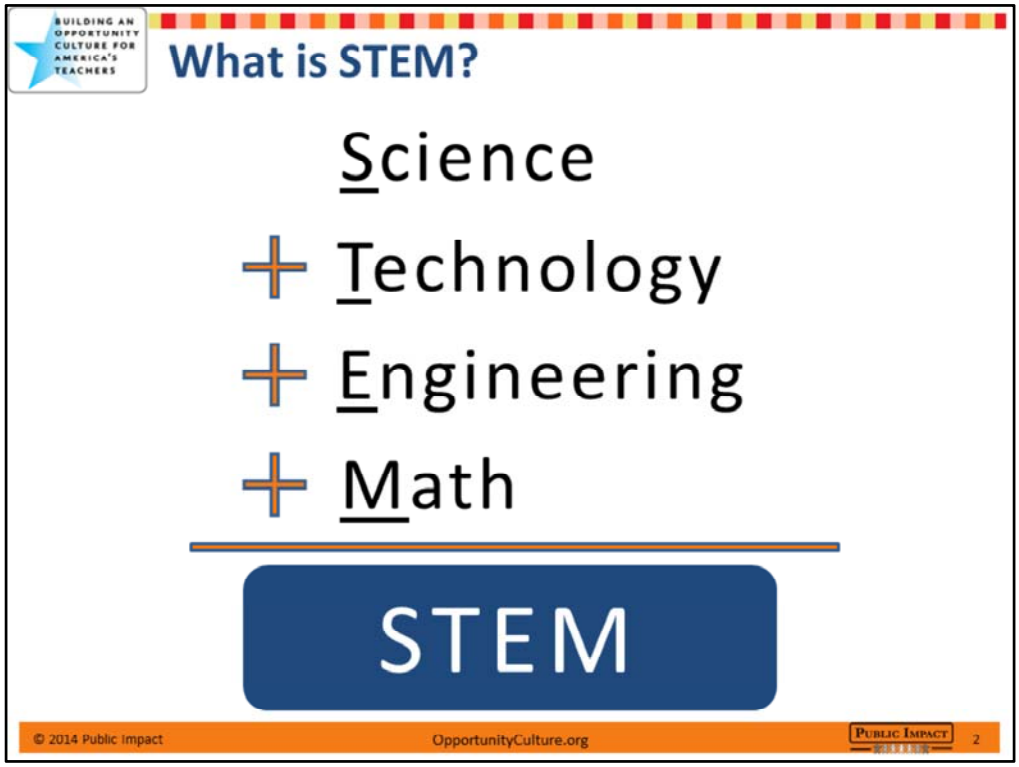


We've seen a lot of ink spilled recently about STEM teaching—but why is there such a great need for more and better STEM teachers?

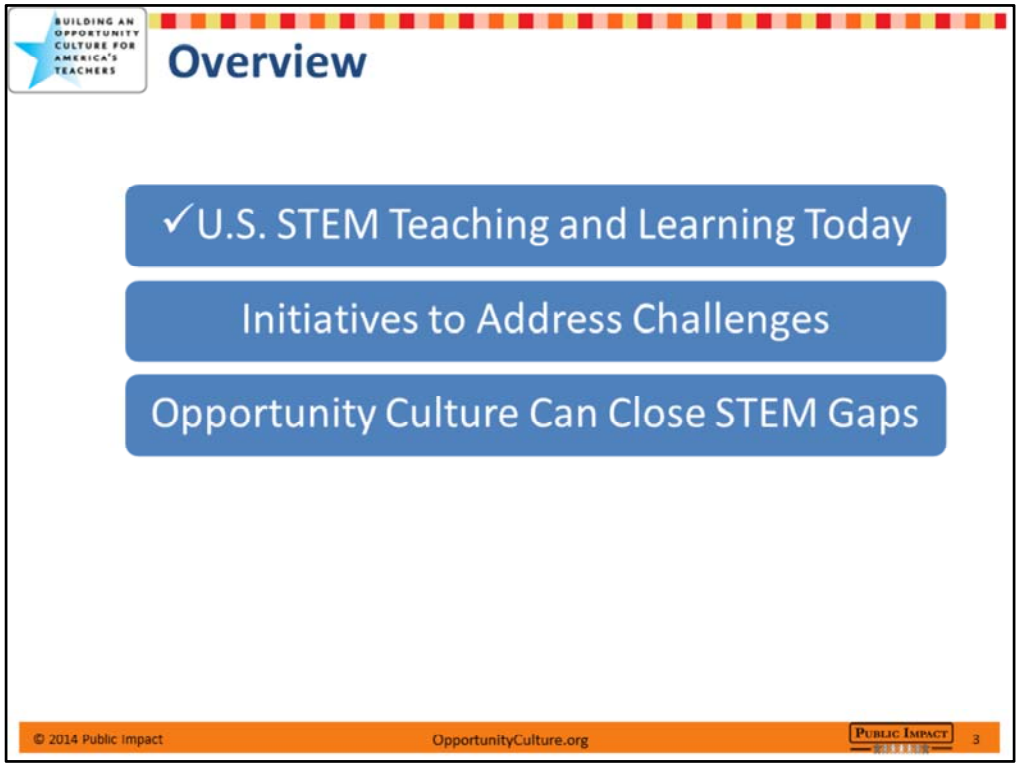
We'll explain why, then focus on **how to attract and keep more** great STEM teachers, and **how to extend the reach** of the excellent STEM teachers we already have and teams they lead to more students.

We'll show **how schools could pay these teachers significantly more without busting budgets**, making teaching more competitive with other STEM job opportunities.

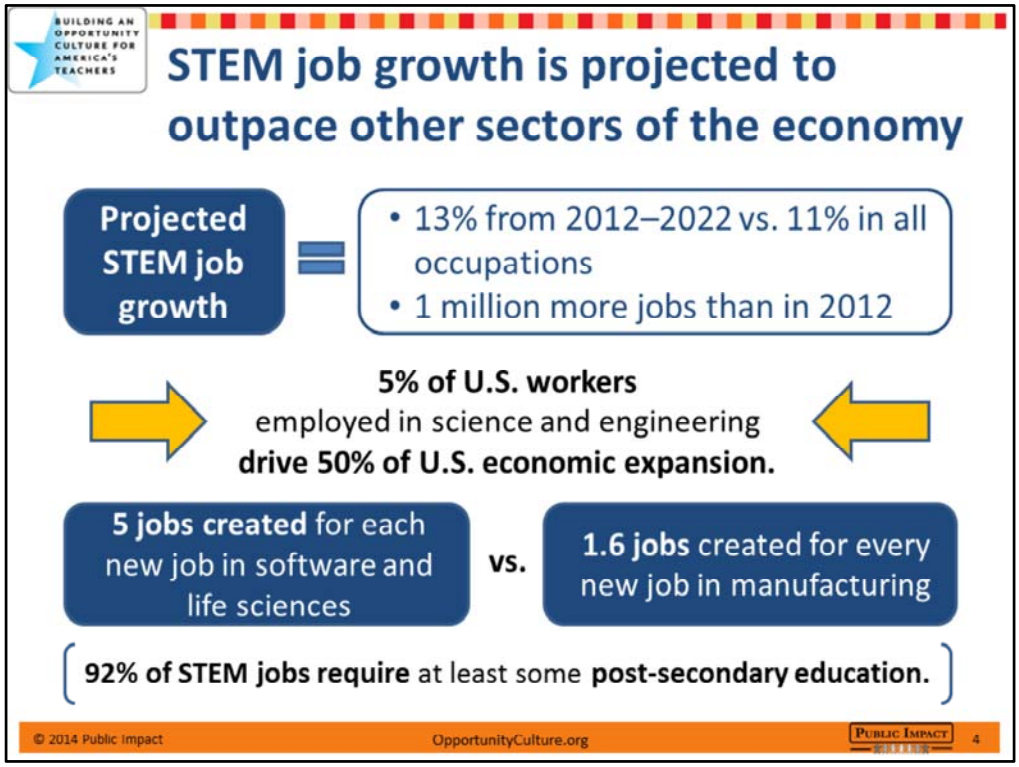
This slide deck is the companion to the *Education Leaders' Brief*, found at http://OpportunityCulture.org/STEM.



What is STEM? These are the four areas of content covered by that acronym. All require significant technical content knowledge.



We'll cover these topics, starting with the landscape of STEM teaching today.



1. STEM jobs are projected to grow 13 percent—adding 1 million net new jobs—by 2022.

2. STEM jobs represent a small portion of all U.S. jobs right now—about 5 percent—but they drive half of all U.S. economic expansion, in turn creating other jobs.

3. Berkeley economics professor Enrico Moretti, in his book ***The New Geography of Jobs***, found that 1.6 jobs were created for every new job in the manufacturing industry—compared with *5 new jobs* created for each job in the software, technology, and life sciences industries.

4. 92 percent of these jobs will require some postsecondary education, so it's important for our students to be ready for college and advanced technical training.

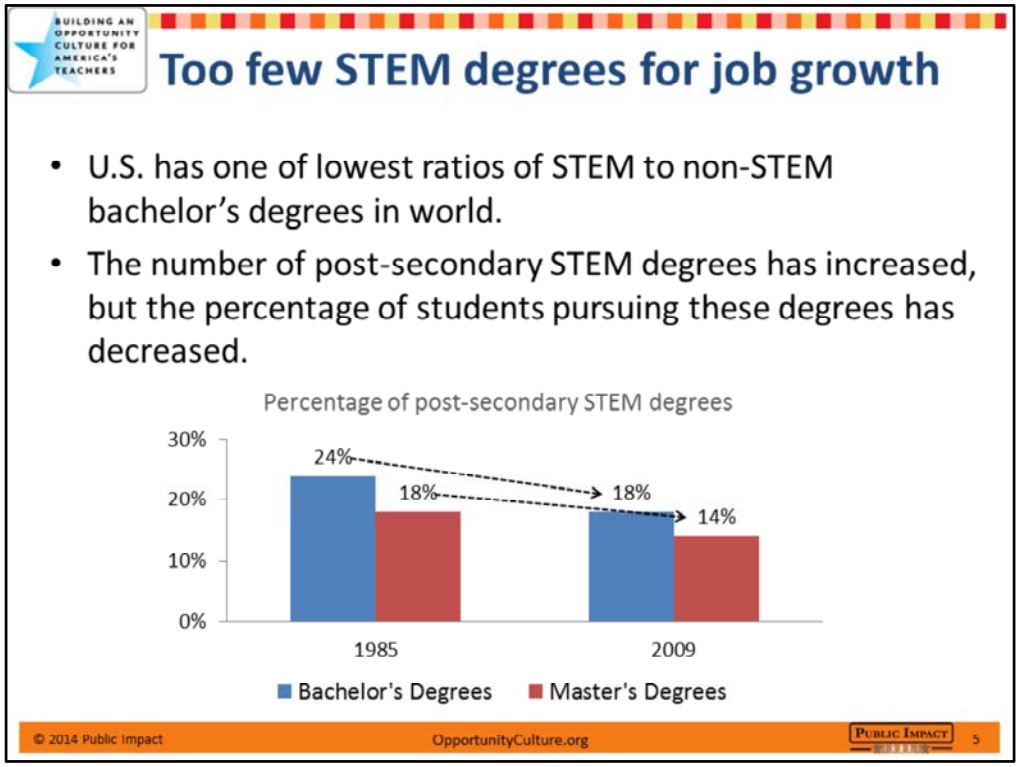
Sources:

Vilorio, D. (2014, spring). Stem 101: Intro to tomorrow's jobs. *Occupational Outlook Quarterly*. Retrieved from http://www.bls.gov/opub/ooq/2014/spring/art01.pdf
http://files.eric.ed.gov/fulltext/ED522129.pdf

Adkins, R. C. (2012, July 9). America desperately needs more STEM students. Here's how to get them. *Forbes.com.* Retrieved from http://www.forbes.com/sites/forbesleadershipforum/2012/07/09/america-desperately-needs-more-stem-students-heres-how-to-get-them/

National Math + Science Initiative. (n.d.). The STEM crisis. Retrieved from http://www.nms.org/AboutNMSI/TheSTEMCrisis/STEMEducationStatistics.aspx

Moretti, E. (2012). *The new geography of jobs.* New York: Houghton Mifflin.

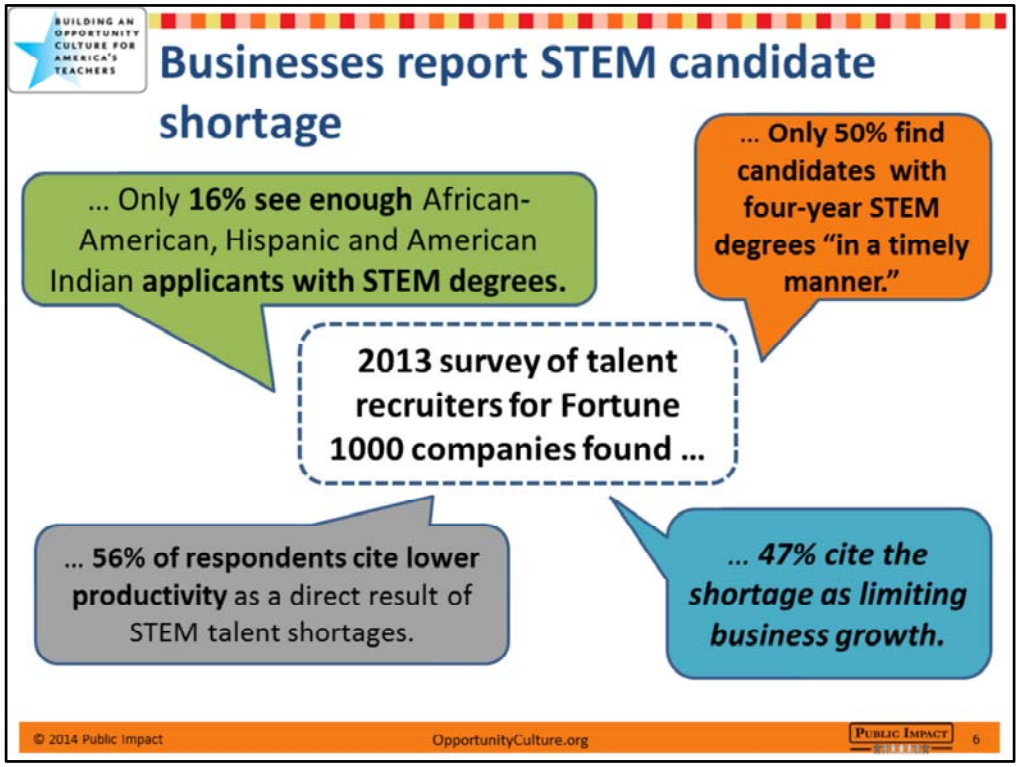


While the promise of the STEM sector is exciting, the **U.S. currently does not have enough people with STEM degrees to support projected job growth**.

In fact, the U.S. has one of the *lowest ratios* of STEM to non-STEM bachelor's degrees in the world. We have seen an increase in the *number* of postsecondary STEM degrees, but the *percentage* of students who pursue these degrees has steadily decreased over the past few decades.

Some have argued that these trends are not a problem, because some STEM jobs do not require a STEM major or advanced degree. Counteracting this, though, is the fact that not all STEM graduates enter STEM positions.

Source:
See page 4 of the report by the U.S. Congress Joint Economic Committee Staff. (2012, April). *STEM education: Preparing for the jobs of the future*. Retrieved from http://www.jec.senate.gov/public/index.cfm?a=Files.Serve&File_id=6aaa7e1f-9586-47be-82e7-326f47658320

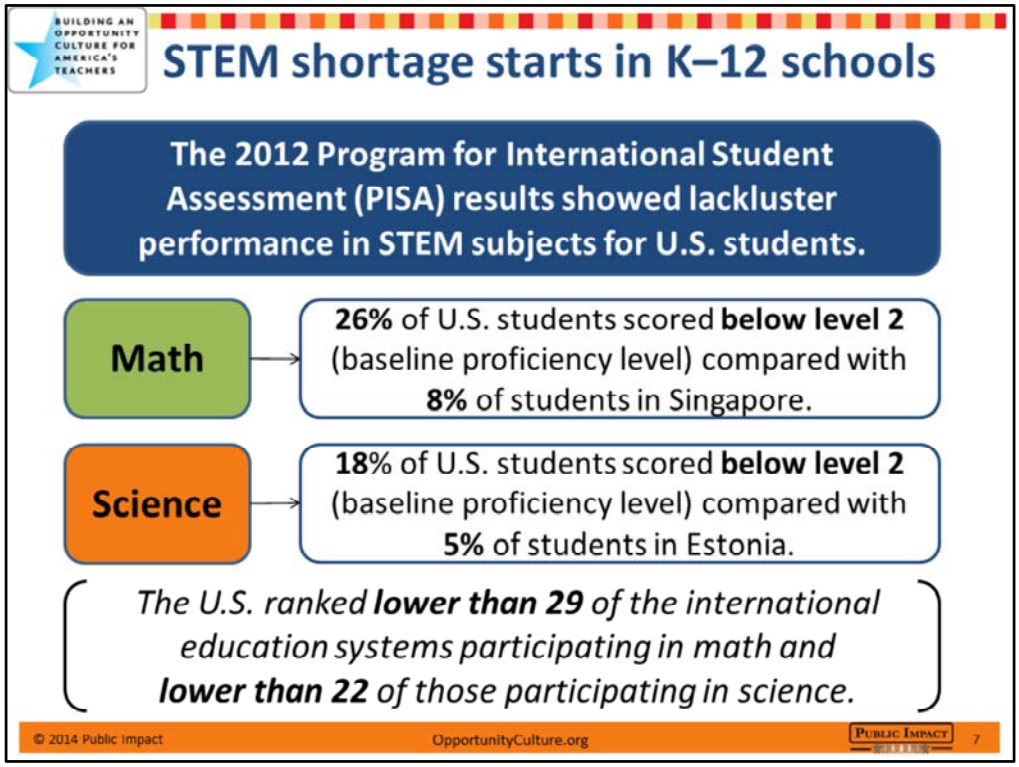


While academics may debate the STEM worker shortage, at least half of employers see a problem. When Bayer Corporation surveyed Fortune 1000 companies in 2013, it found that:

- … Only 16 percent see enough African-American, Hispanic and American Indian applicants with STEM degrees
- … Only 50 percent find candidates with four-year STEM degrees "in a timely manner"
- … 56 percent of respondents cite lower productivity as a direct result of STEM talent shortages
- … 47percent cite the shortage as limiting business growth

Perhaps most important, when businesses limit growth due to talent shortages, that further limits the job creation that STEM jobs drive, ultimately limiting broader, nationwide economic growth.

Source:
International Communications Research. (2013, October). *The Bayer facts of science education XVI: U.S. STEM workforce shortage—myth or reality? Fortune 1000 talent recruiters on the debate: Executive summary.* Bayer Corporation. Retrieved from http://bayerus.online-pressroom.com/bayerus/assets/File/Exec_Summary2013.pdf



Why aren't more college students pursuing STEM degrees and careers? The answer is probably complicated, but one reason is that **students are not prepared to pursue STEM degrees when they leave high school**.

If we look at the 2012 PISA results—an assessment that compares student performance in math, science, and reading among 15- and 16-year-olds in 65 countries—U.S. student results are lackluster in math and science.

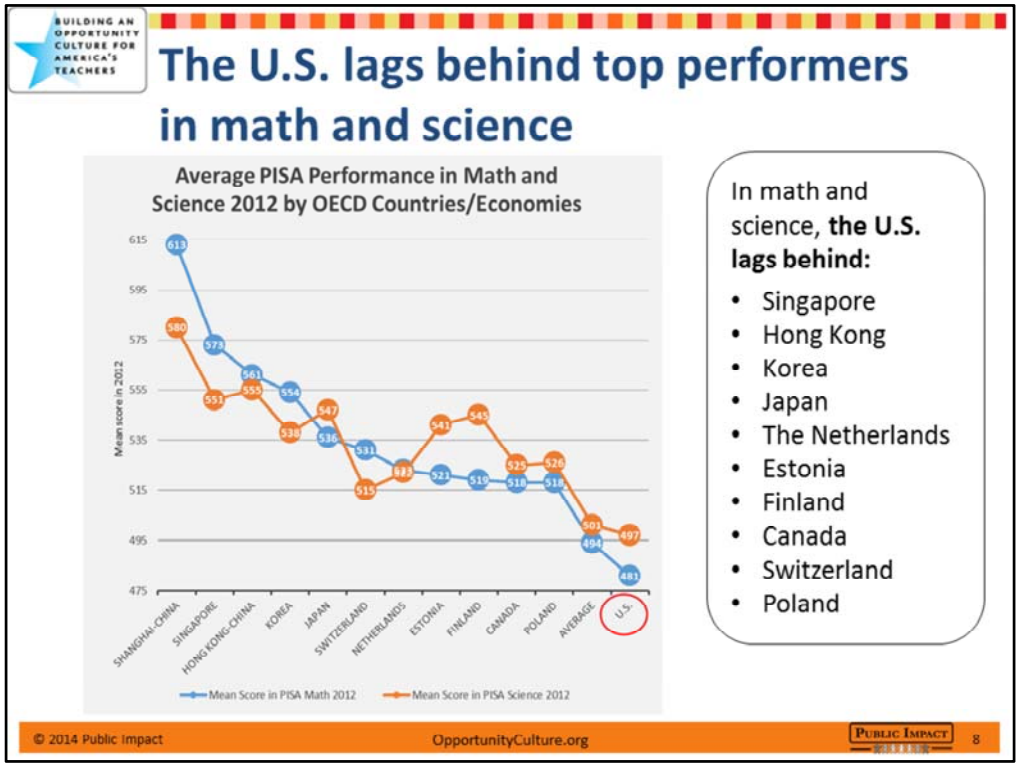
- 26 percent of students scored below level 2 in math—the baseline proficiency cutoff, which was more than three times the percentage of students in Singapore who fell below level 2.
- In science, 18 percent of US students scored below level 2—more than three times the percentage of students in Estonia who were below the baseline proficiency cutoff.

Overall, the U.S. ranked lower than 29 of the educational systems participating in math, and lower than 22 participating systems in science. A recent study indicates that these **STEM learning gaps exist among children of well-educated parents, not just economically disadvantaged students in the U.S.**

Sources:

National Center for Education Statistics. (n.d.). Program for International Student Assessment (PISA). Retrieved from http://nces.ed.gov/surveys/pisa/countries.asp

National Center for Education Statistics. (n.d.). Selected findings from PISA 2012. Retrieved from http://nces.ed.gov/surveys/pisa/pisa2012/pisa2012highlights_1.asp



Other nations are preparing far more of their students for higher-level STEM studies. Their students are ready to take these courses—and the jobs that follow. If we look at this visual comparison of the U.S. to the top PISA performers, the U.S. is at the back of the pack. Our students clearly are not getting the content they need to compete internationally.

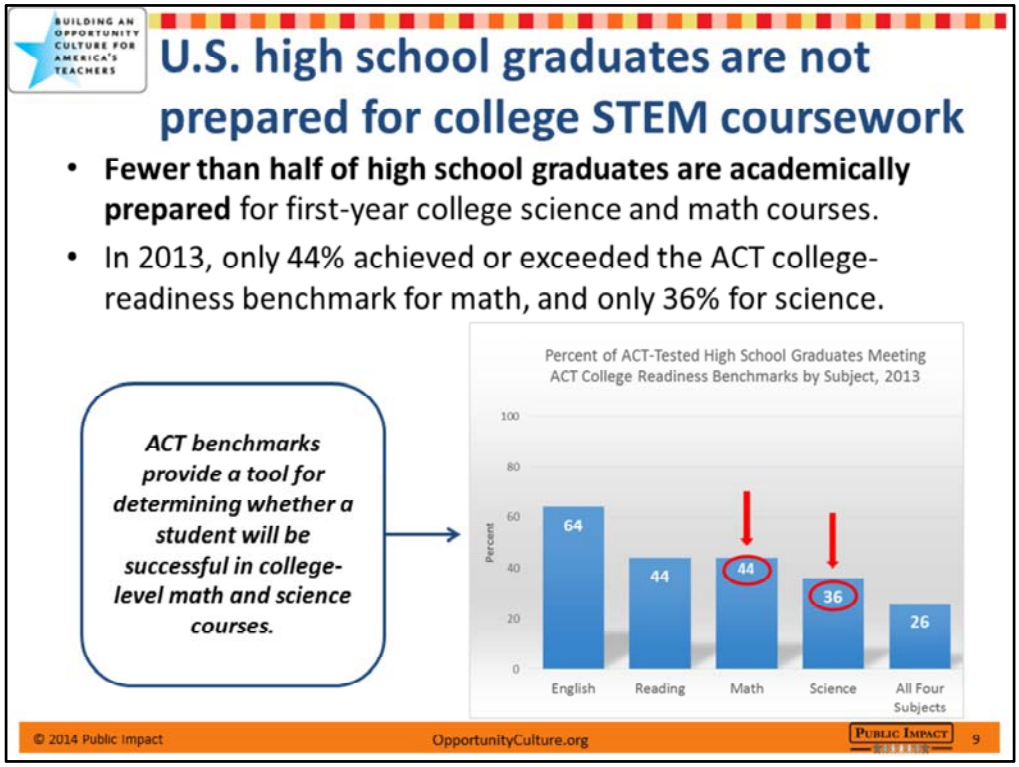
And the comparison is even worse for children of well-educated parents in the U.S. versus comparable peers in other nations.

So, while we may be able to compete on creativity, for now, in these fields where technical content is also needed, our students just aren't prepared.

Sources:

OECD. (2014). *PISA 2012 results: What students know and can do—Student performance in mathematics, reading and science (Volume 1, revised edition).* Retrieved from http://www.oecd.org/pisa/keyfindings/pisa-2012-results-volume-I.pdf

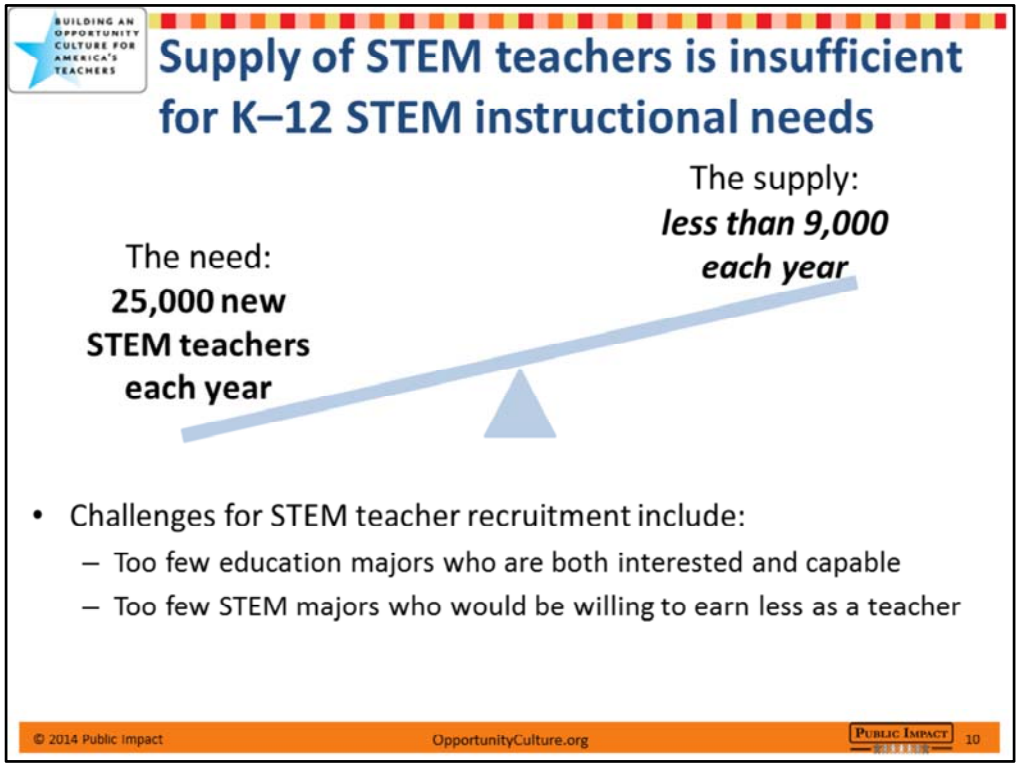
OECD. (2013). *Snapshot of performance in mathematics, reading and science.* Retrieved from http://www.oecd.org/pisa/keyfindings/PISA-2012-results-snapshot-Volume-I-ENG.pdf



If we judge student STEM content mastery by our *own,* domestic standards, or at least those of the ACT test writers, far too few high school students are prepared for college-level work in math and science.

Fewer than half **of 2013 high school graduates who took the ACT met college readiness benchmarks in math or science. Only 44 percent met the benchmark in math, and even fewer—36 percent—met the benchmark in science**.

Source:
ACT, Inc. (2013). *The condition of college & career readiness 2013: National*. Iowa City, IA: Author. Retrieved from https://www.act.org/research/policymakers/cccr13/pdf/CCCR13-NationalReadinessRpt.pdf



Why aren't U.S. students learning more and better in STEM subjects in K–12 schools?

One important reason might be that there is a **shortage of highly qualified STEM teachers**.

According to the White House, our nation needs 25,000 new STEM teachers each year to replace teachers who retire or leave the profession. But based on high school students' self-reporting of interest in STEM teaching,* there is an enormous gap. Less than half of that number of students who would be "highly qualified" for secondary STEM education want to teach.

Too few college students majoring in education are qualified, and too few STEM majors would be willing to earn so much less than they can in other jobs.

*Calculated the number of students who:
--Self-identified as "fairly sure" or "very sure" that they wanted to be math or science teachers, and
--Met the relevant science or math ACT College Readiness Benchmark.

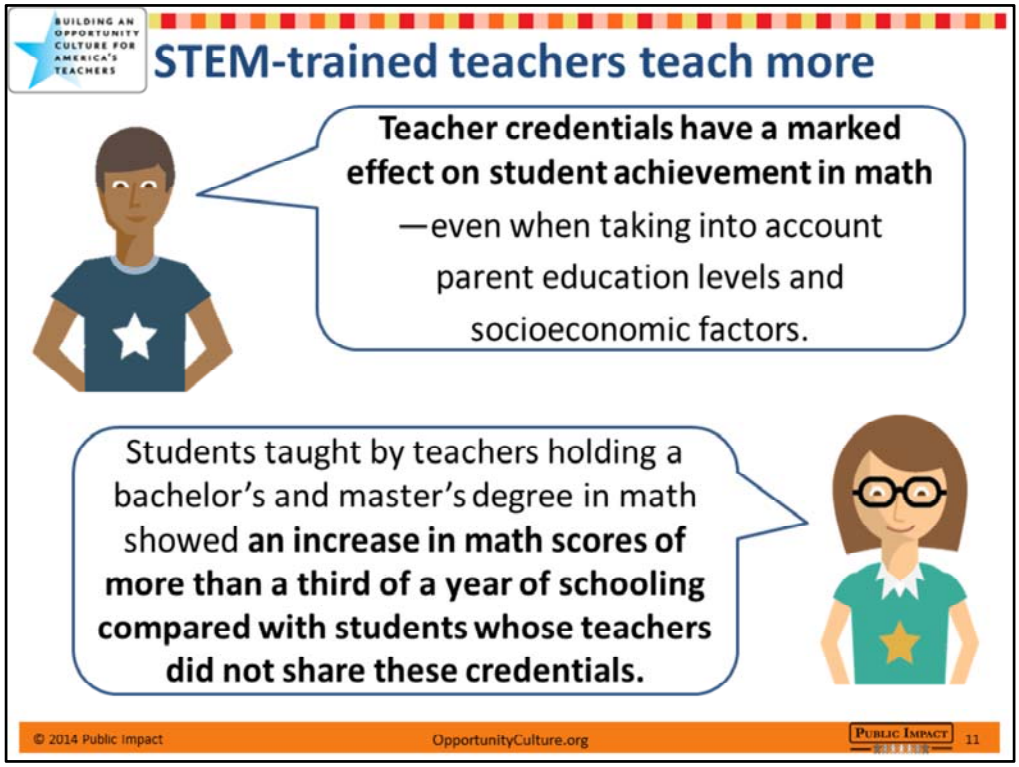
Detailed Discussion Notes:
The ACT paper addresses whether a policy goal of 10,000 new STEM teachers per year is

feasible (for 100Kin10 policy).
It finds an annual shortfall of 1,500 (on ACT population only; assume 3,000 if assume SAT population is equivalent). Narrows to students who are very or fairly certain of math/science teaching as a career choice, then eliminates those who don't test proficient.

To plug the gap, U.S. would need to recruit 5 percent of intended education majors into STEM who were not originally interested in math/science; or 1 percent of undecided career choices for students who met math/science proficiency benchmark.

Sources:
President's Council of Advisors on Science and Technology. (2010, September). *Prepare and inspire: K–12 education in science, technology, engineering, and math (STEM) for America's future*. Washington, DC: Executive Office of the President. Retrieved from http://www.whitehouse.gov/sites/default/files/microsites/ostp/pcast-stemed-report.pdf

ACT, Inc. (2013, June). *STEM educator pipeline: Doing the math on recruiting math and science teachers*. Iowa City, IA: Author. Retrieved from http://www.act.org/research/policymakers/pdf/STEM-Educator-Pipeline.pdf



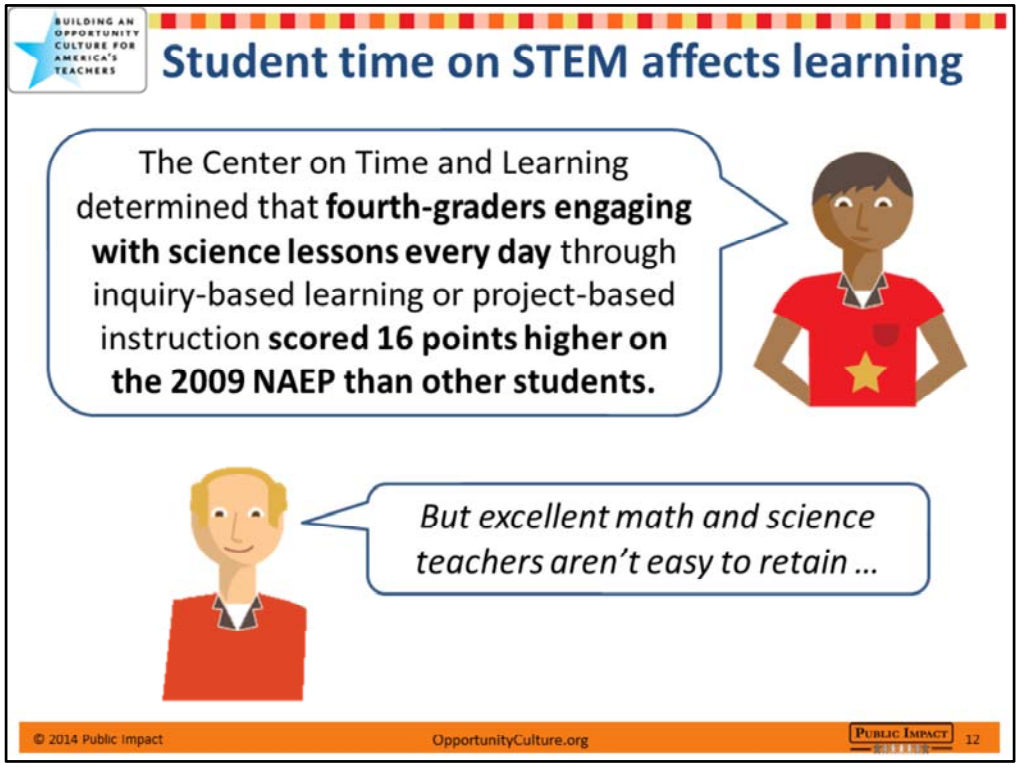
We don't just need more bodies in STEM teaching roles. We need *teachers who know the technical content*. **Research shows that students learn more from STEM-trained teachers**:

For example, **students taught by teachers holding a bachelor's and master's degree in math learn more than a third of a year of additional content annually than students taught by teachers who don't hold these credentials**. (The study noted that this did not take into account that higher-performing students could be taking higher-level math classes, and might be more likely to have teachers with advanced skills, and to have better math test scores).

Sources:

Clotfelter, C. T., Ladd, H. F., & Vigdor, J. L. (2007, January). *How and why do teacher credentials matter for student achievement?* [working paper]. Washington, DC: National Center for Analysis of Longitudinal Data in Education Research (CALDER). Retrieved from http://files.eric.ed.gov/fulltext/ED509655.pdf

Hill, J. G., & Gruber, K. J. (2011, May). *Education and certification qualifications of departmentalized public high school-level teachers of core subjects: Evidence from the 2007–08 Schools and Staffing Survey.* Washington, DC: National Center for Education Statistics. Retrieved from http://nces.ed.gov/pubs2011/2011317.pdf

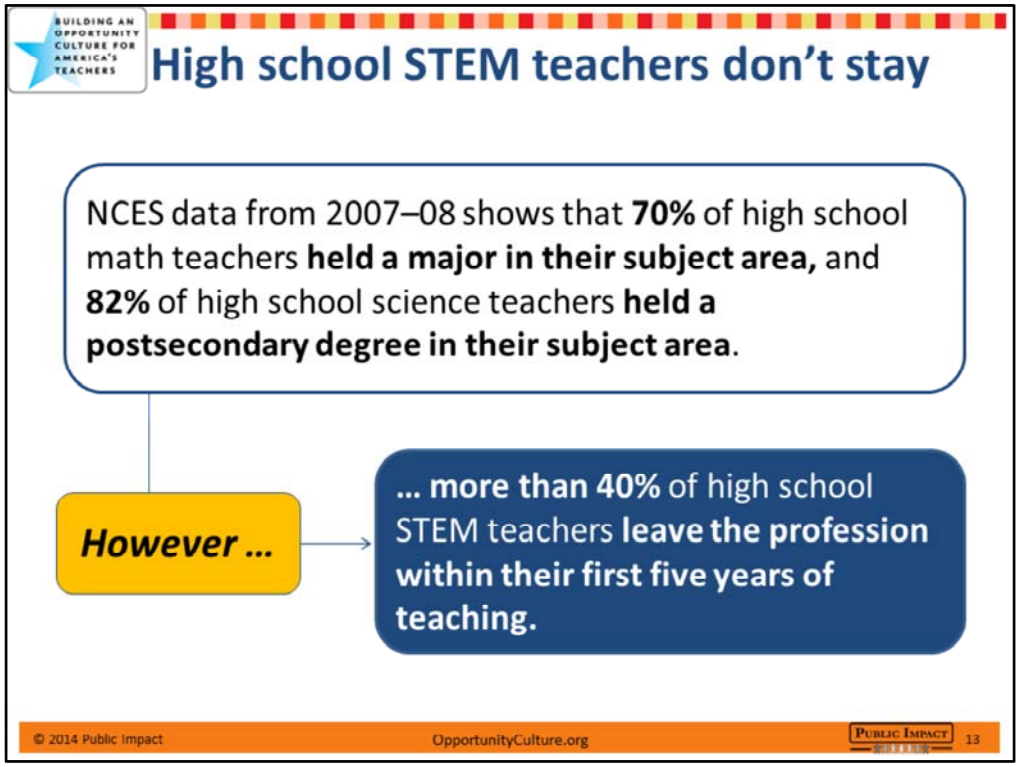


Not surprisingly, the Center on Time and learning found that **if students spend more time on science projects in school, they learn more**.

So, if all of this is true, why don't schools just hire and keep more well-trained math, science, and other STEM teachers?

Sources:
National Center on Time & Learning. (2011, fall). *Strengthening science education: The power of more time to deepen inquiry and engagement*. Boston, MA: Author. Retrieved from http://www.ewa.org/sites/main/files/strenghtheningscienceeducation.pdf

Report generated at: http://nces.ed.gov/nationsreportcard/naepdata/report.aspx



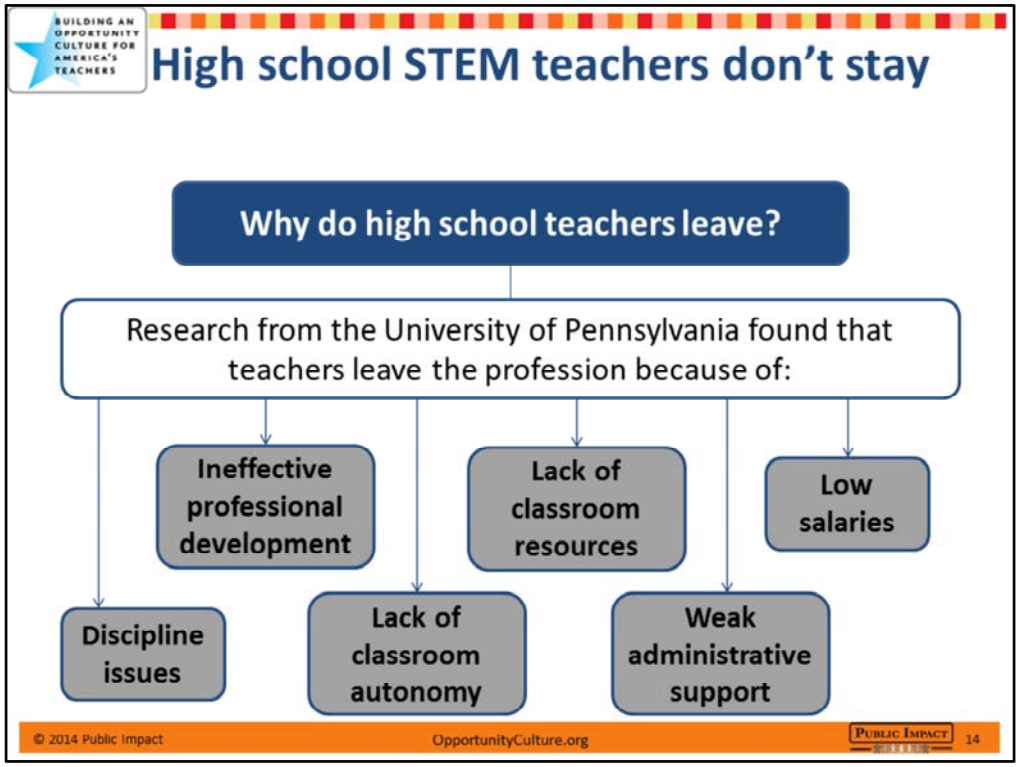
Well, we've done a better job of recruiting than of retaining STEM-qualified teachers.

Even though many of the STEM teachers we do have in our high schools hold degrees in their subject areas, they often do not stay in the classroom. In fact, **more than 40 percent of high school STEM teachers leave the profession before they even complete five years of teaching**…just when they are reaching higher levels of teaching effectiveness.

Sources:

Ingersoll, R., Merrill, L., & May, H. (2013). What are the effects of teacher education and preparation on beginning math and science teacher attrition? [preliminary draft]. Paper presented at the 2013 annual meeting of the American Educational Research Association. Retrieved from http://www.cpre.org/sites/default/files/meetingpaper/1479_richard.pdf

Hill, J. G., & Gruber, K. J. (2011, May). *Education and certification qualifications of departmentalized public high school-level teachers of core subjects: Evidence from the 2007–08 Schools and Staffing Survey.* Washington, DC: National Center for Education Statistics. Retrieved from http://nces.ed.gov/pubs2011/2011317.pdf



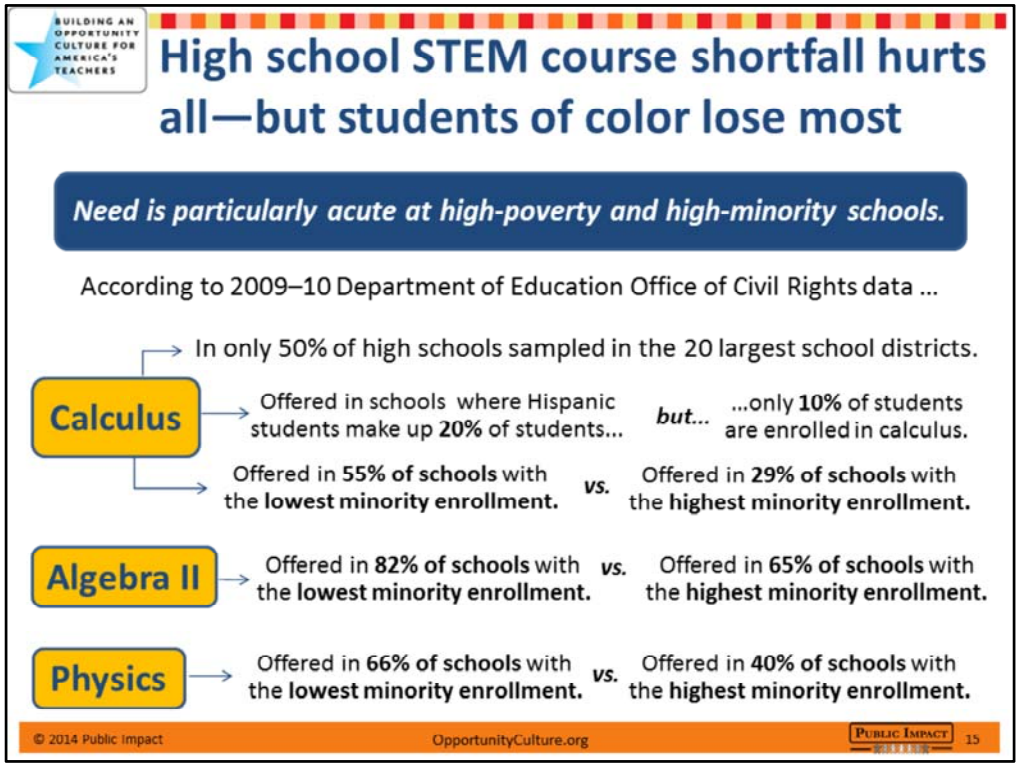
So why don't high school science and math teachers stay in the profession?

UPenn Graduate School of Education researcher Richard Ingersoll identified several reasons that teachers report leaving:

- They lack enough classroom resources
- Teacher salaries are low
- Discipline issues disrupt the classroom
- The professional development they receive is ineffective (for math teachers, the usefulness of PD concerning student discipline and classroom management was a strong factor)
- They do not have enough classroom autonomy (cited by math teachers, not science teachers)
- They do not receive adequate administrative support.

Sources:

Ingersoll, R. M., & May, H. (2010, October). *The magnitude, destinations, and determinants of mathematics and science teacher turnover*. Philadelphia, PA: Consortium for Policy Research in Education. Retrieved from http://www.cpre.org/images/stories/cpre_pdfs/math%20and%20science%20teacher%20turnover_ingersoll%20and%20may%202010_final%20web%20ready.pdf



What is the impact? Challenges with recruiting and retaining teachers means students lack access to enough STEM courses.

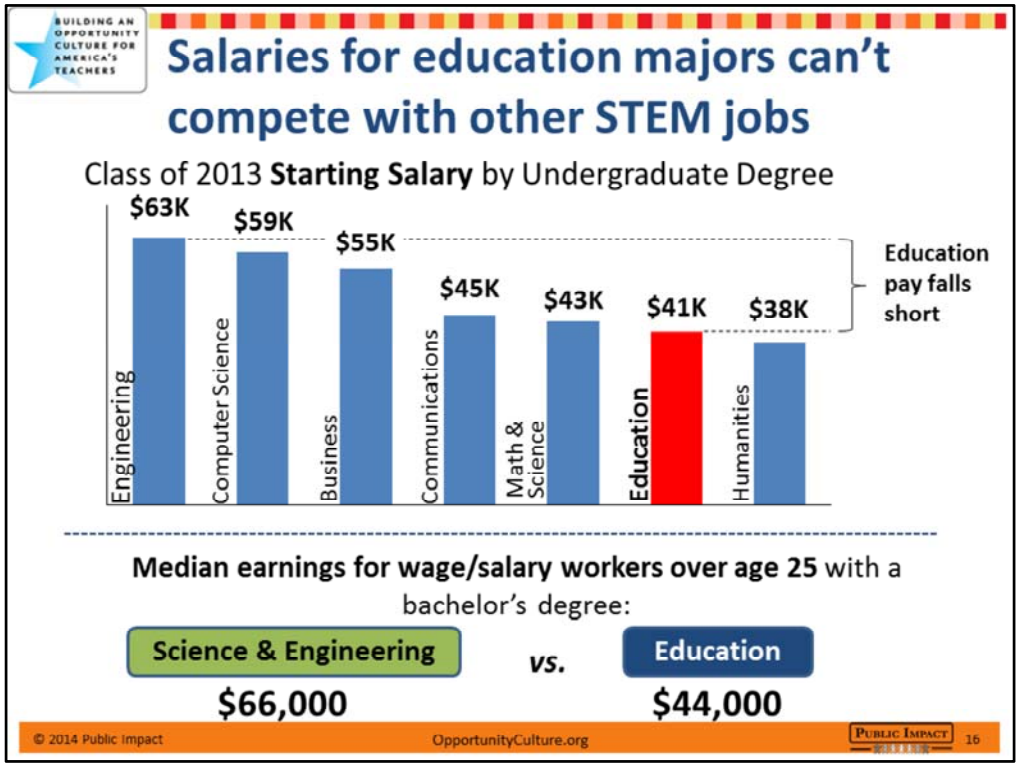
Many schools simply do not offer advanced math or physics.

The course shortfall is particularly acute at high-poverty and high-minority schools, which are far less likely to offer advanced math and science courses.

The Office for Civil Rights within the U.S. Department of Education took a look at high school course offerings and found that:

- **Calculus**: Only 50 percent of high schools sampled in the 20 largest school districts offered calculus. Further, Hispanic students make up 20 percent of the student body at high schools that offer calculus, but only 10 percent of students are enrolled in calculus. The subject is offered in 55 percent of schools with the *lowest* minority enrollment, compared with only 29 percent of schools with the *highest* minority enrollment.
- **Algebra**: The story is similar for Algebra II. 82 percent of schools with the lowest minority enrollment offer Algebra II, but far fewer schools, 65 percent, with the highest minority enrollment offer it.
- **Physics** was offered in 66 percent of schools with the lowest minority enrollment, but when we look at schools with the highest minority enrollment, only 40 percent of schools offer it.

Source:
U.S. Department of Education Office for Civil Rights. (2012, March 12). *The transformed civil rights data collection.* Retrieved from http://www2.ed.gov/about/offices/list/ocr/docs/crdc-2012-data-summary.pdf



So why is it so hard to get STEM college majors to enter and continue to teach? One factor almost certainly is the wide salary gap.

Starting salaries are 5 percent to 50 percent higher in other STEM jobs versus teaching STEM.

And for STEM workers over age 25, median salaries in non-teaching jobs are 50 percent higher than STEM teaching salaries.

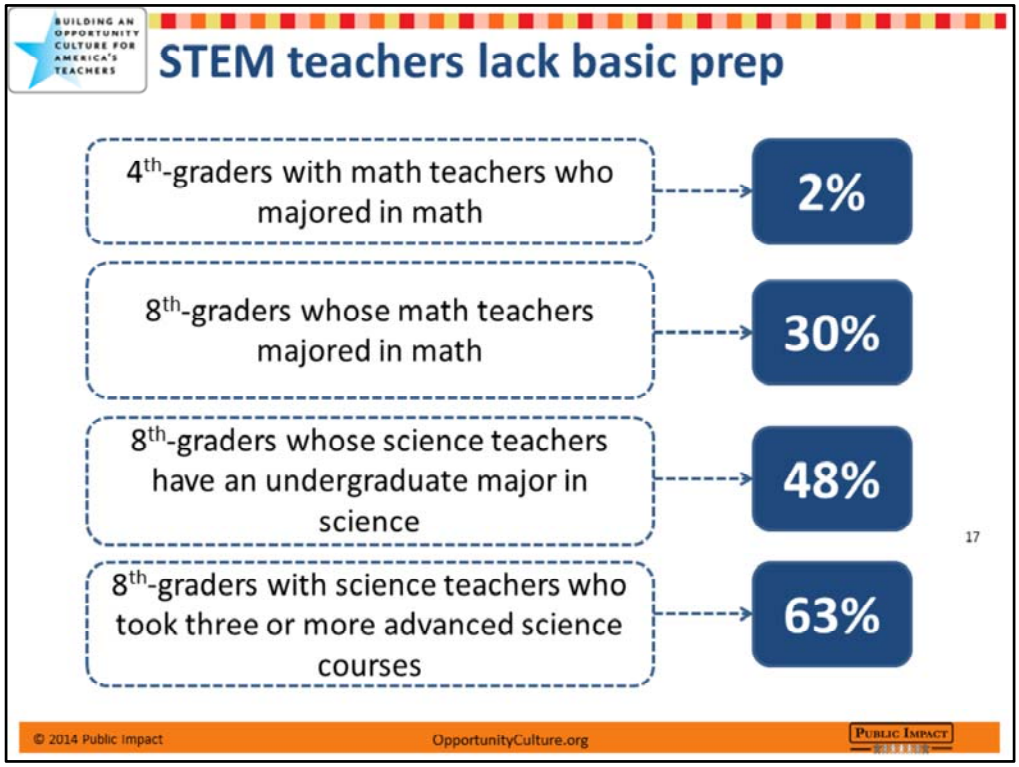
No wonder schools lose so many of those who enter STEM teaching by the fifth year.

And for teachers who do stay, salary growth will not keep up. One 2014 study compared the average salary growth of a biology teacher in Chicago with that of a Chicago biologist. Both start out at nearly equal pay—with the biologist actually making $2,000 less. But by year two the biologist is making more, and that grows by the 10th year of experience to $107,000, compared with a 10th-year biology teacher's $69,000 salary. By year 16, that would grow to $120,000 for the biologist, but just $81,000 for the teacher.

Sources:
For 2013 average salary, see: NACE. (2014, January). NACE salary survey. Retrieved from https://www.naceweb.org/uploadedFiles/Content/static-assets/downloads/executive-summary/2014-january-salary-survey-executive-summary.pdf

For median earnings, see Table 1, *Detailed field of bachelor's degree by median population annual earnings and selected employment characteristics for the population 25 years and over: 2011*, at http://www.census.gov/prod/2012pubs/acsbr11-10.pdf

For salary growth comparison, see Figure 2 in: TNTP. (2014). *Shortchanged: The hidden costs of lockstep teacher pay*. Brooklyn, NY: Author. Retrieved from http://tntp.org/assets/documents/TNTP_Shortchanged_2014.pdf



So, if STEM graduates are either leaving the teaching profession or not joining it in the first place, **who *is* teaching students STEM subjects?**

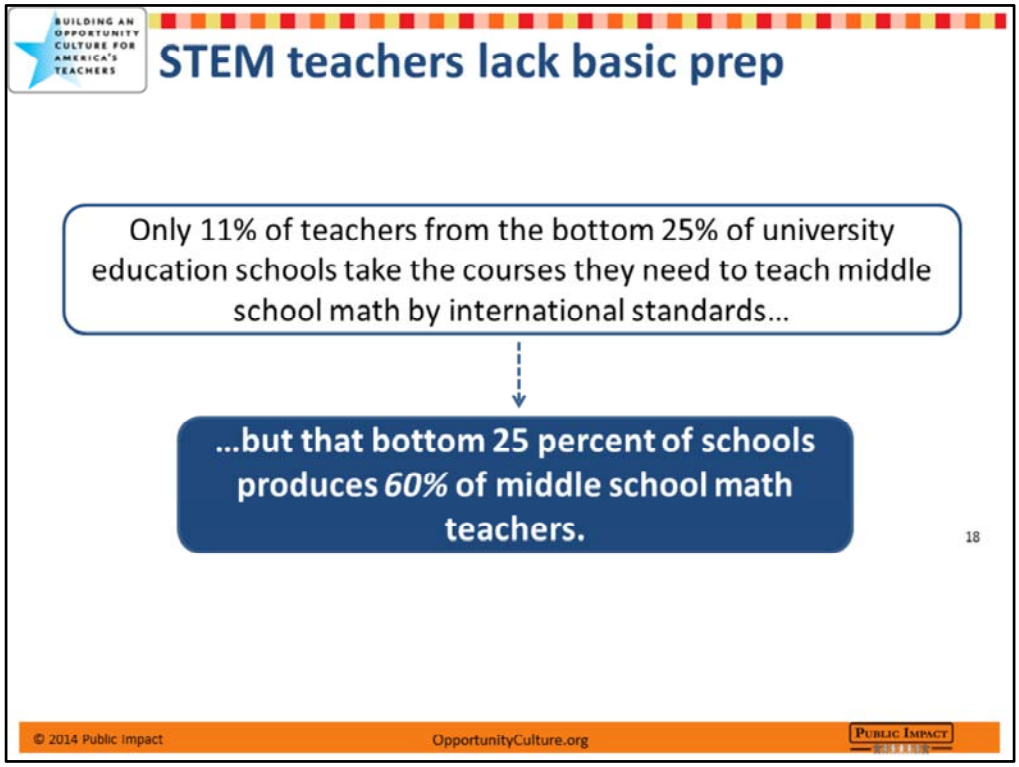
Not people with lots of STEM expertise …

- For example, only 2 percent of fourth-graders have math teachers who have undergraduate degrees in math (2011 data)
- 30 percent of eighth-graders have a math teacher with an undergraduate major in math (2013 NAEP, Math assessment)
- 48 percent of eighth-graders have science teachers who majored in science (2011 data), and 63 percent eighth-graders have a science teacher who took at least three advanced science *courses* (2011 data)

- A 2014 study shows that **only 3 of 907 teacher prep programs require elementary teacher candidates to complete basic science** (biology, chemistry, and physics) *and* math courses; nearly half of the programs require little or no basic STEM coursework.

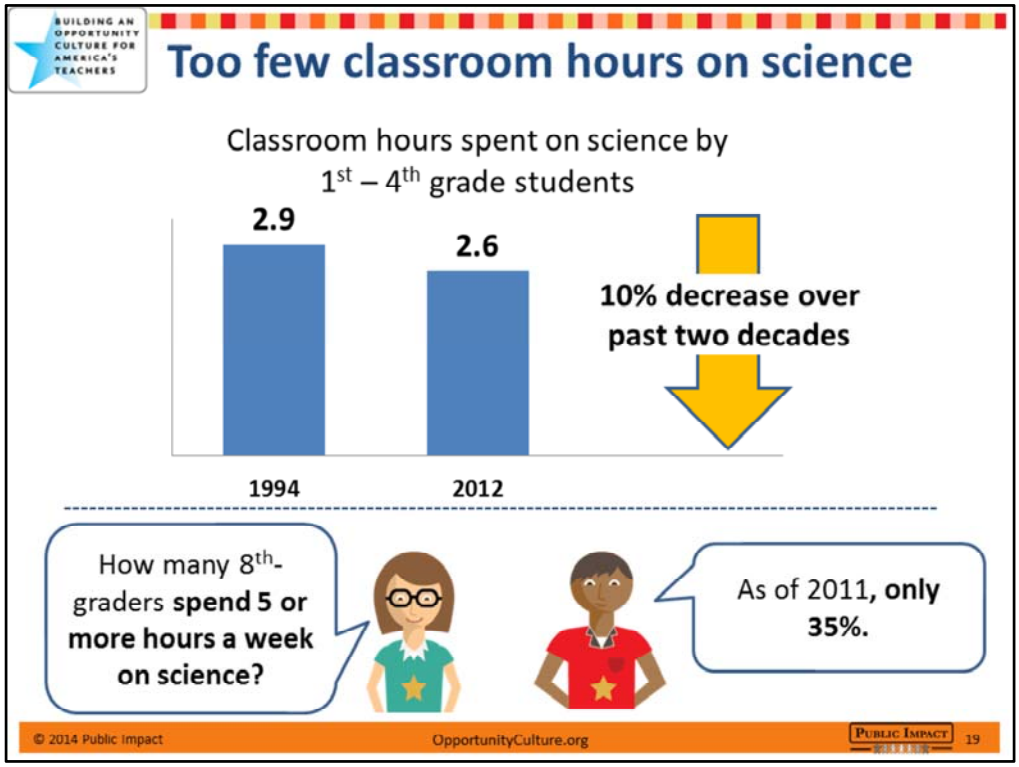
Source:
Change the Equation. (n.d.). Vital signs. Retrieved from http://vitalsigns.changetheequation.org/#us-United States-Teachers

National Council on Teacher Quality. (2014, June 27). Time to STEM the tide [blog post]. Retrieved from http://www.nctq.org/commentary/viewStory.do?id=33905



And a Michigan State study using international benchmarks found that **only 11 percent of the teachers from the bottom 25 percent of university education schools are *taking the courses they need to teach middle school math* … but that bottom 25 percent of schools produces 60 percent of middle school math teachers**.

Source:
Schmidt, W., Burroughs, N., & Cogan, L. (2013). *World class standards for preparing teachers of mathematics* [working paper]. East Lansing, MI: Center for the Study of Curriculum at Michigan State University. Retrieved from http://education.msu.edu/csc/pdf/World-Class-Standards-for-Preparing-Teachers-of-Mathematics.pdf

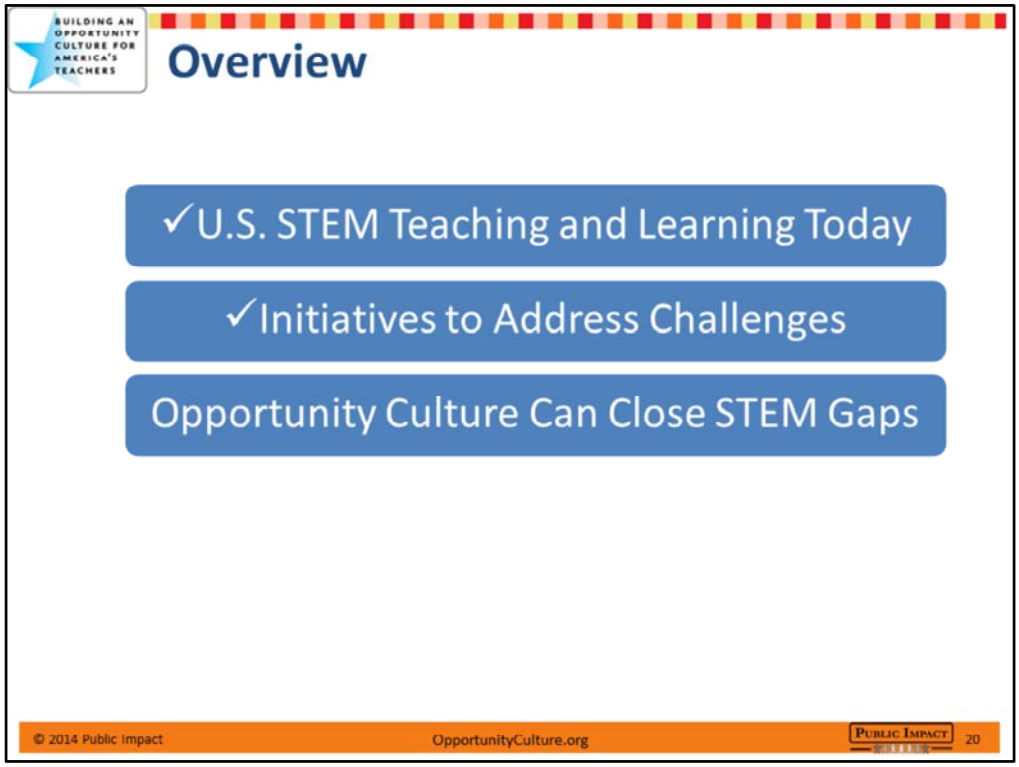


Not only are too few STEM teachers qualified, **our students also aren't spending enough time on science.**

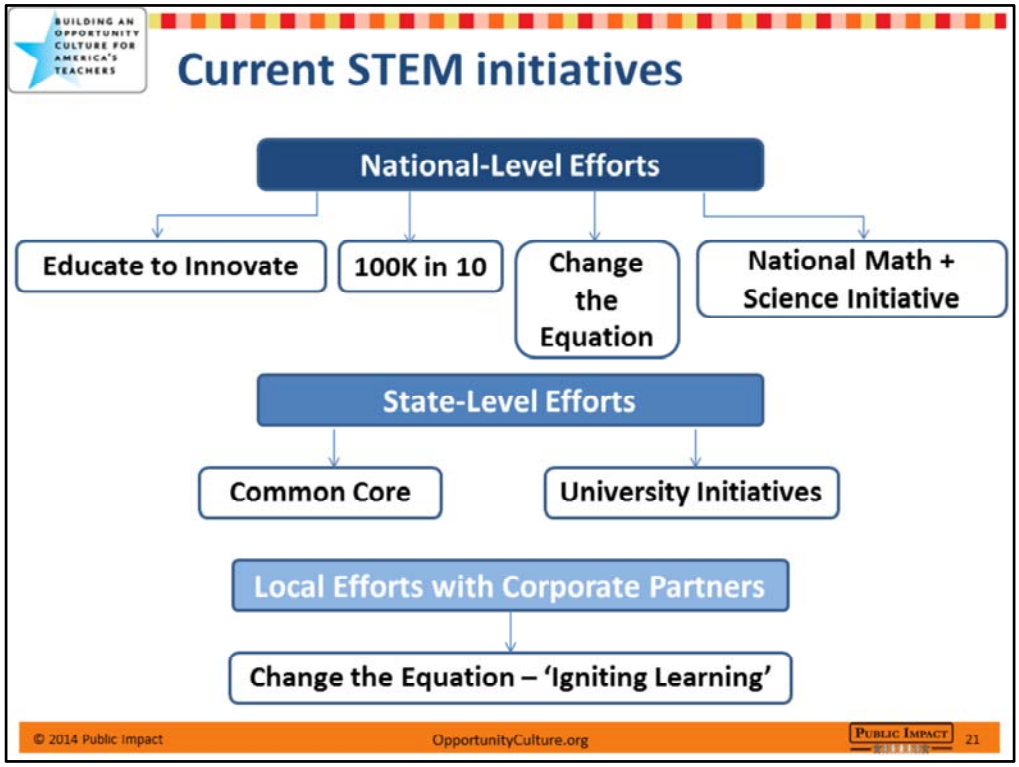
The number of classroom hours that first- to fourth-graders spend on science has decreased 10 percent since 1994.

And only 35 percent of eighth-graders spend 5 or more hours on science each week.

Source:
Change the Equation. (n.d.). Vital signs. Retrieved from http://vitalsigns.changetheequation.org/#us-United States-Challenging Content

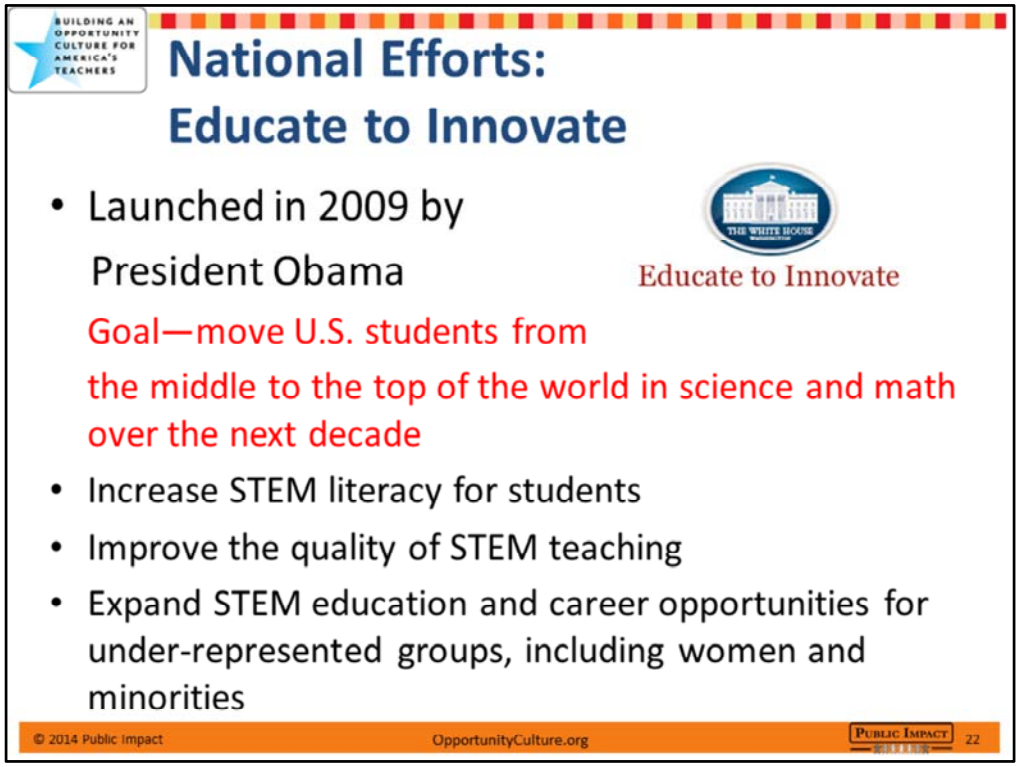


Let's look at some of the efforts to address these challenges.



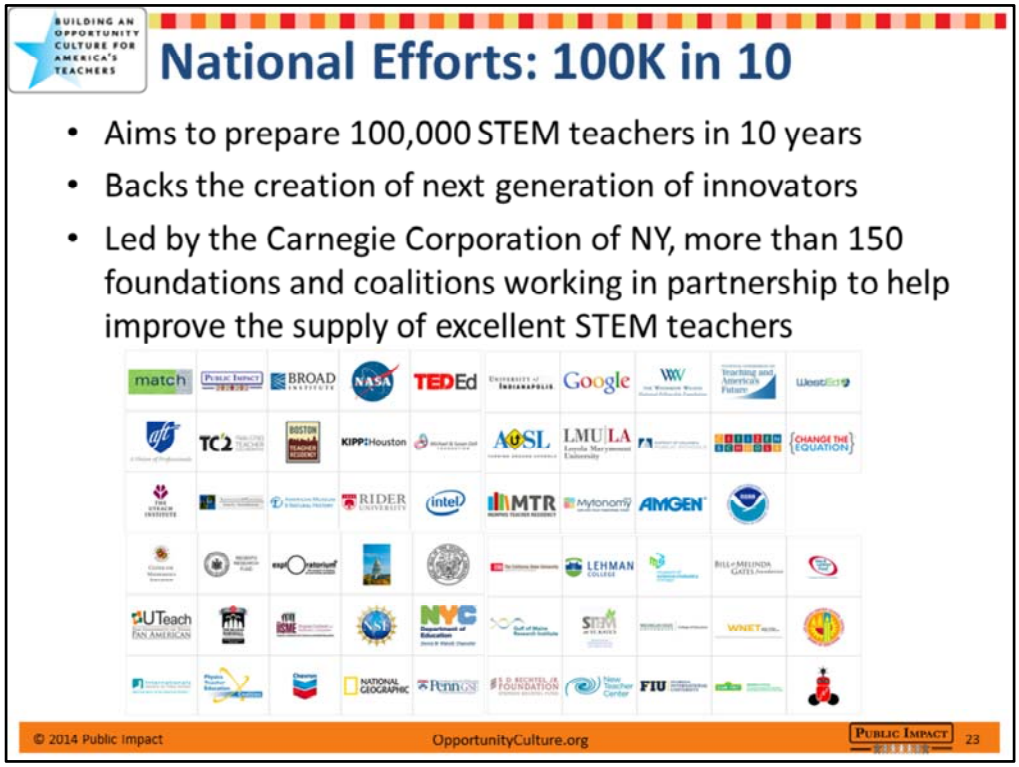
What are we doing about this gap in U.S. schools?

Well, lots of organizations are working on it. Here we share some of these initiatives, in brief.



The White House is working on it.

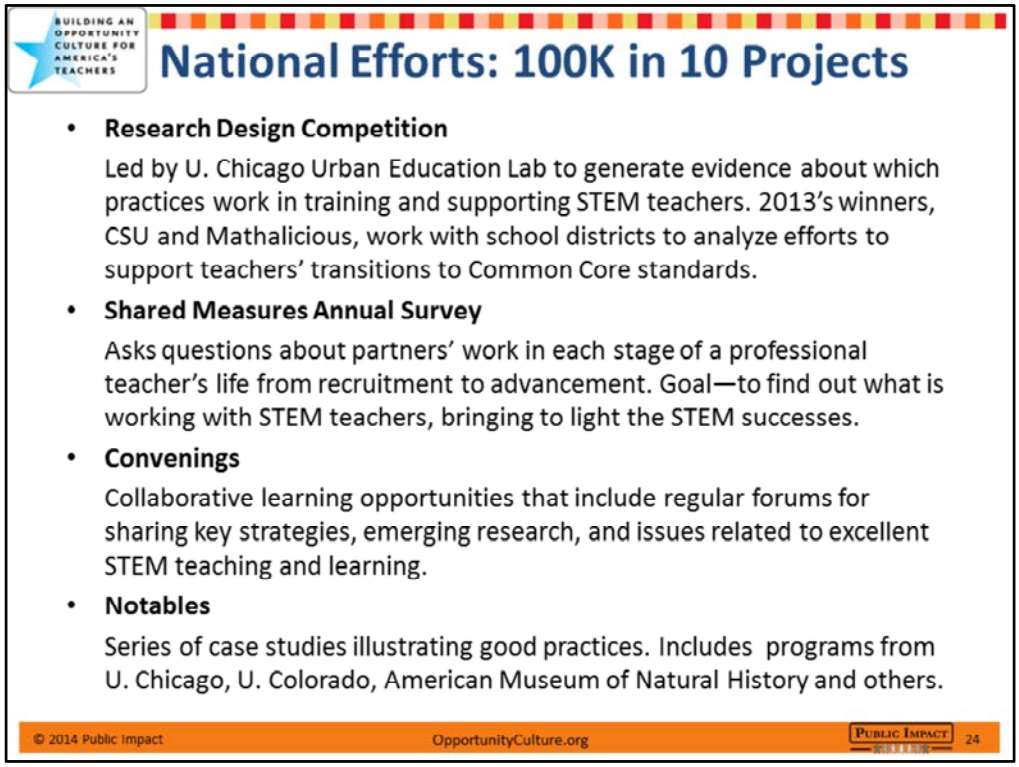
http://www.whitehouse.gov/issues/education/k-12/educate-innovate



Many public and private organizations are working on it.

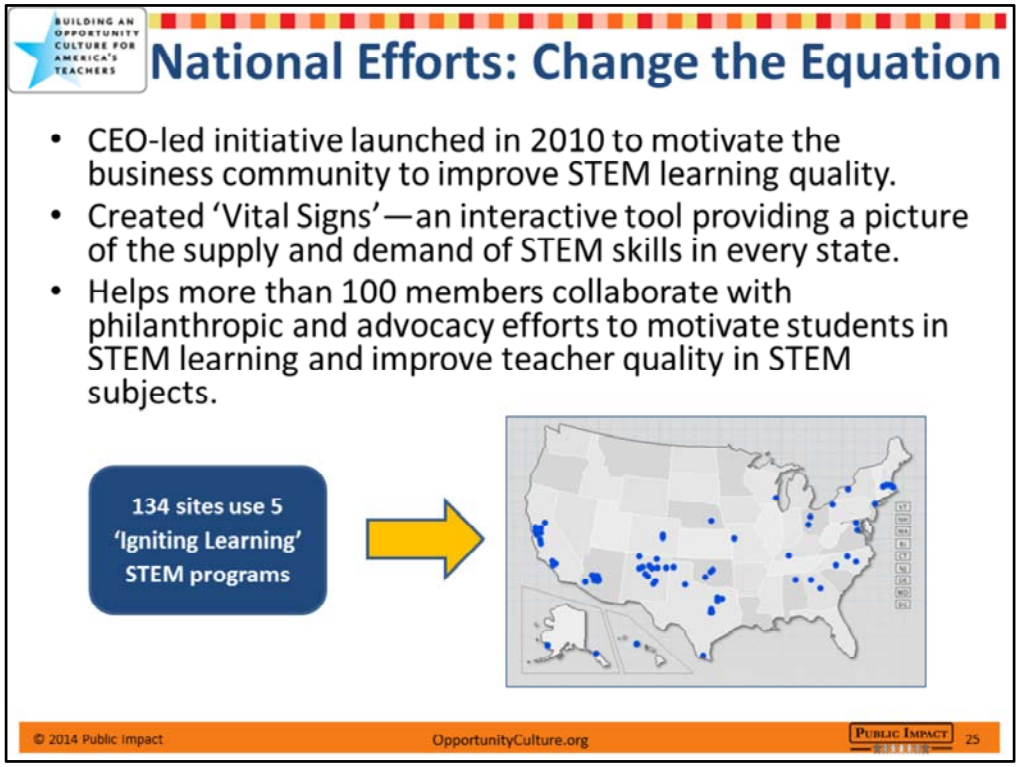
A large collaborative called 100K in 10 aims to prepare 100,000 STEM teachers in 10 years, using the various efforts of the partners to address the shortfall.

http://www.100kin10.org/



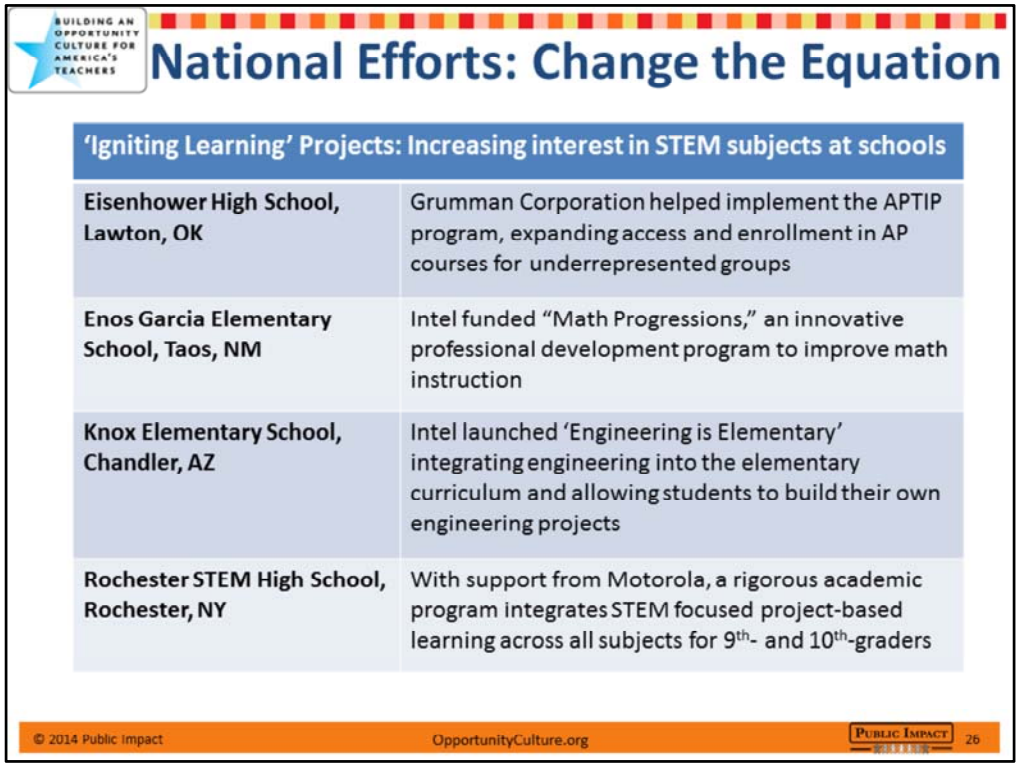
For example, 100K in 10 partners recognize and elevate successful STEM training practices, share information about activities and strategies, and publish work illustrating good practices in STEM teaching.

http://www.100kin10.org/page/research-and-learning



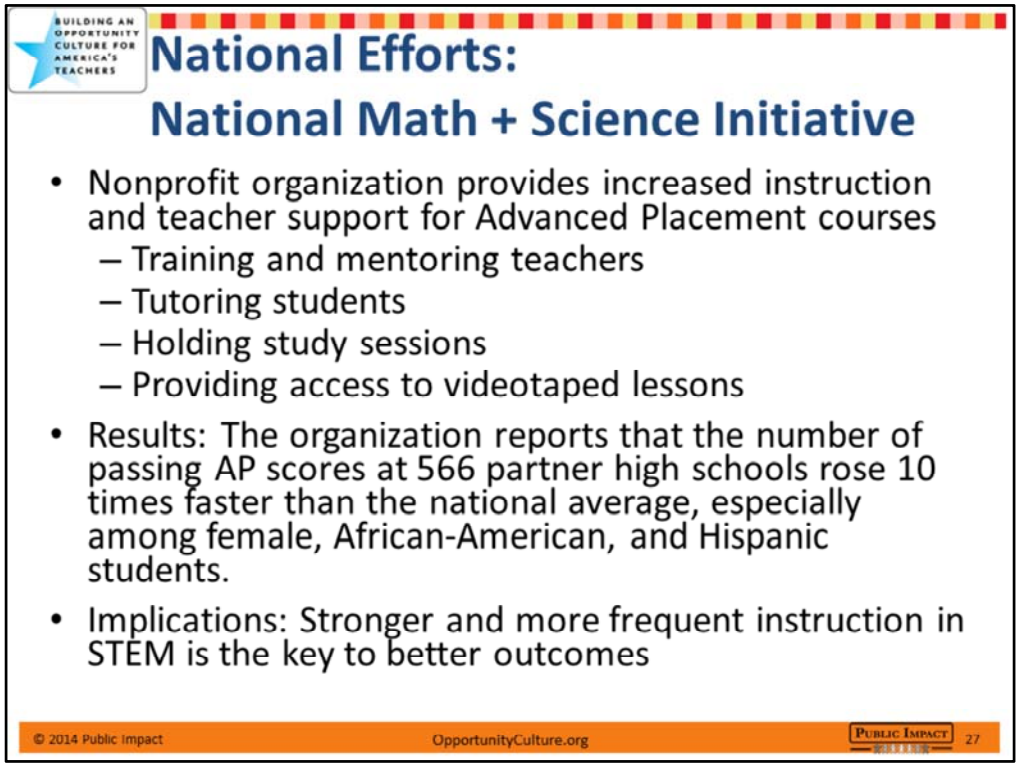
Change the Equation has made efforts to better match the supply and demand for STEM teaching.

http://changetheequation.org/about-change-equation
http://vitalsigns.changetheequation.org/
http://www.ignitinglearning.org/spotlight-schools



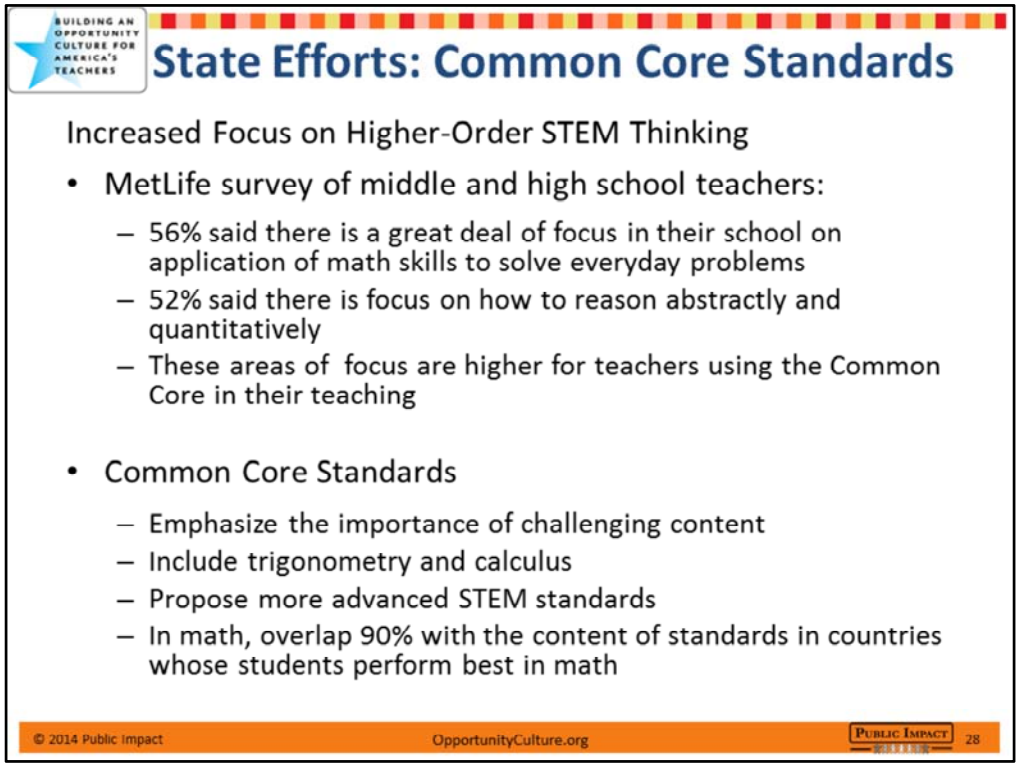
Change the Equation's "Igniting Learning" projects help corporations support STEM teaching in their local communities.

http://www.ignitinglearning.org/spotlight-schools



The National Math + Science Initiative has very promising outcomes in its efforts to increase AP exam pass rates, especially among female, African-American and Hispanic students. It increased AP pass rates 10 times faster than average by better preparing teachers and helping students spend more time studying math and science.

http://www.nms.org/



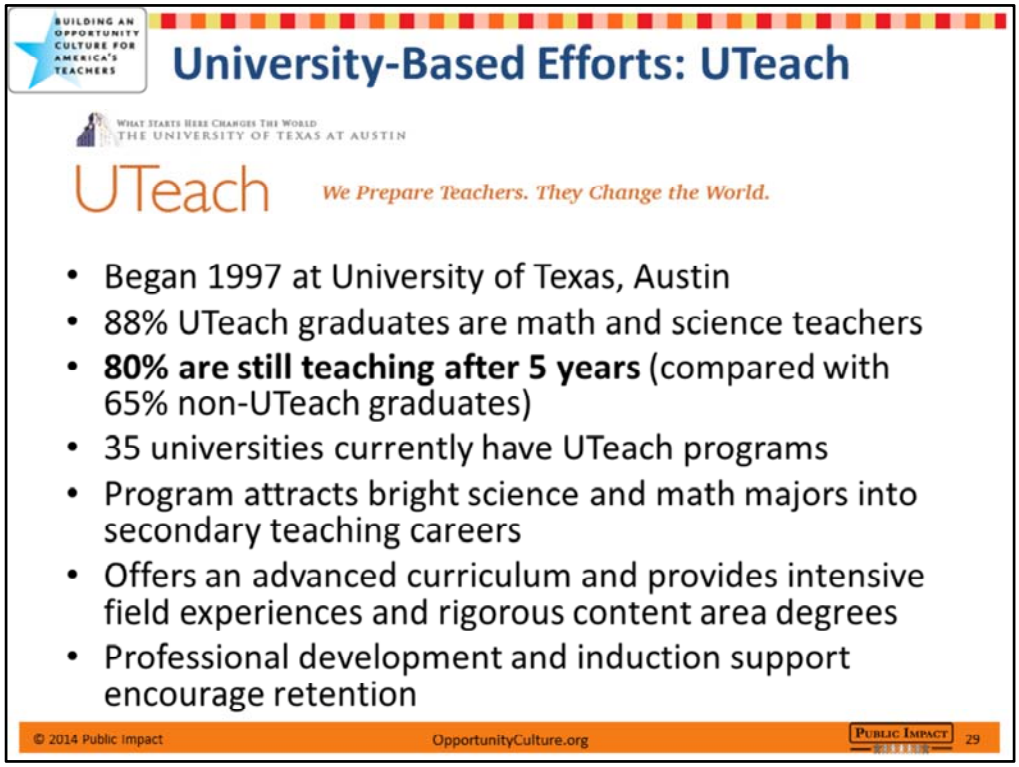
States that have adopted the Common Core are shifting their curricula toward higher-level learning in STEM subjects and toward applying STEM knowledge to solve problems.

This aligns with the teaching practices of most countries that excel in STEM learning outcomes.

Sources:

Harris Interactive. (2013, February). *The MetLife survey of the American teacher: Challenges for school leadership.* New York, NY: MetLife Foundation. Retrieved from http://files.eric.ed.gov/fulltext/ED542202.pdf

Schmidt, W. (2011). The Common Core State Standards for mathematics [PowerPoint presentation]. Retrieved from http://www.achieve.org/CCSS-schmidt-research

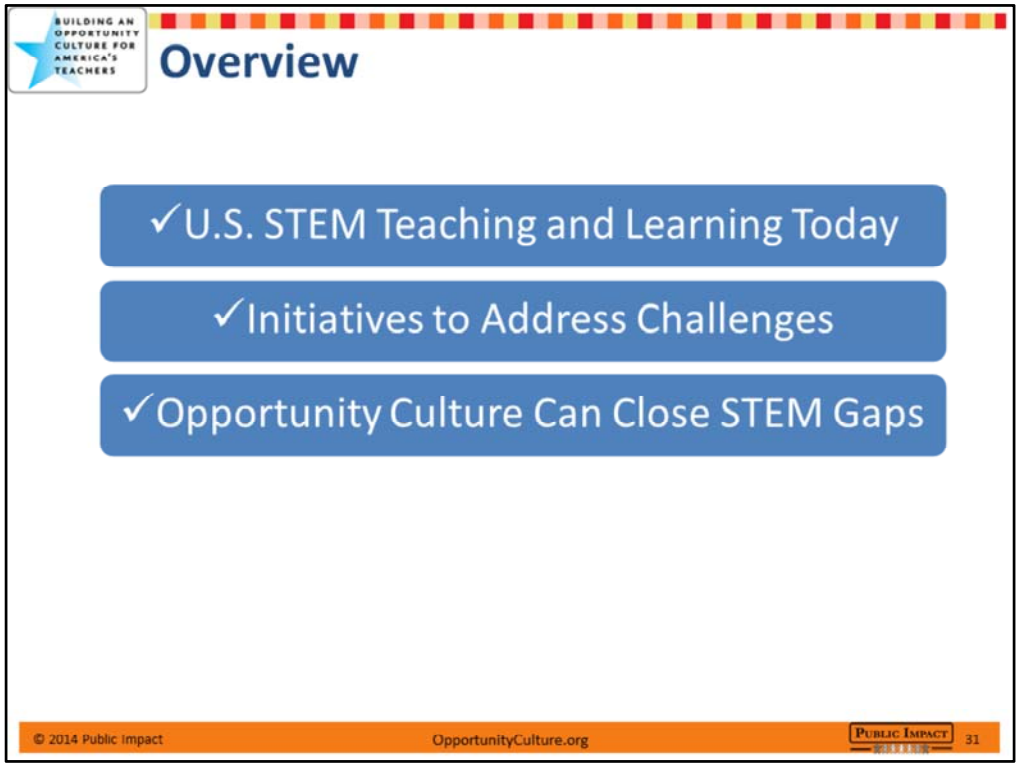


Universities are getting involved by offering targeted preparation for future STEM teachers, and by helping those teachers make the transition to teaching successfully, such as the University of Texas Uteach program.

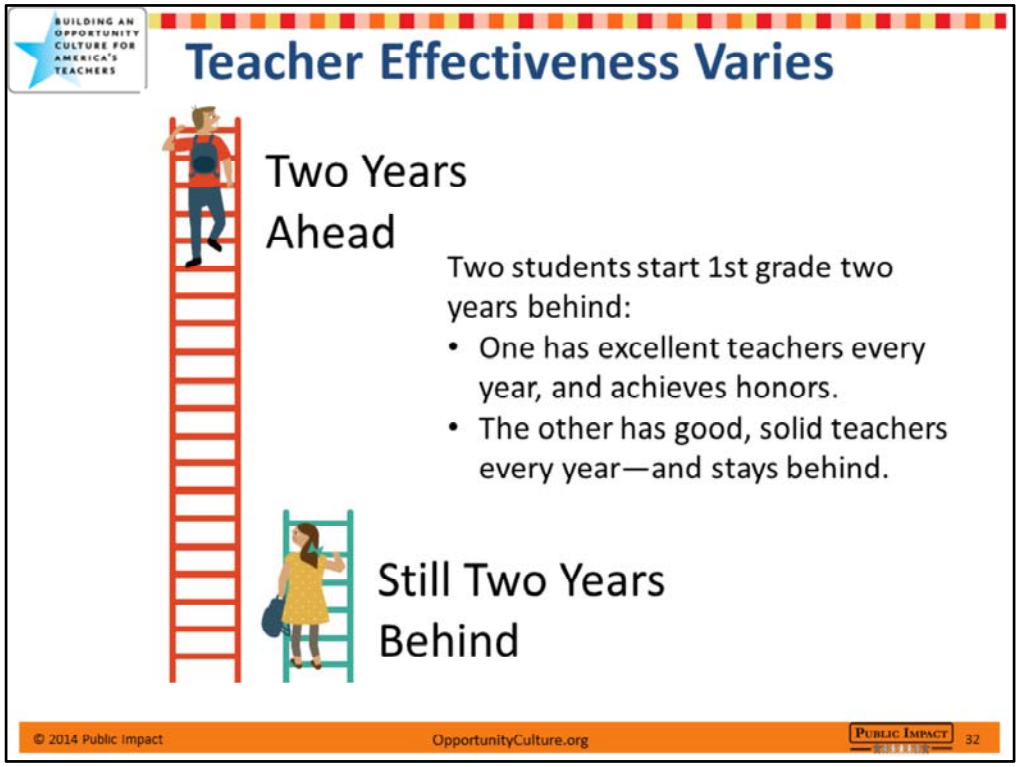
Source:
The UTeach Institute. (n.d.). About the UTeach Institute. Retrieved from http://uteach-institute.org/about

And New York has made efforts to help minorities pursue STEM degrees and jobs.

Source:
Sacco, M. (2012, October 8). Minority graduation rates on the rise at SBU. *The Statesman*. Retrieved from http://sbstatesman.com/tag/the-education-trust/



What else can be done? Next we describe how new school models can reach more students with the excellent STEM teachers *already* in schools, and attract, retain, and develop more of them.



Additional research indicates that **some teachers—regardless of technical qualifications, and across subjects—help students learn far more than is typical**.

Students in classes with "excellent teachers"—those in roughly the top 25 percent—gain about an extra half-year of learning each year compared with an average teacher, or three times as much progress as students with teachers in the bottom quartile.

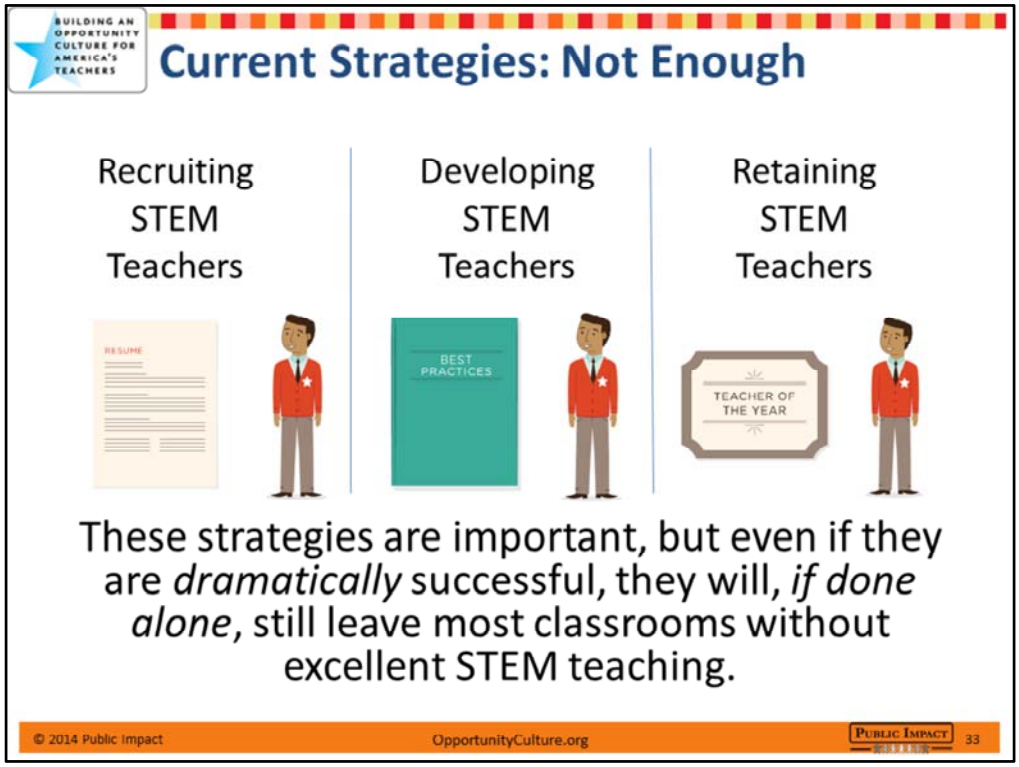
Consistent growth like this is essential to help large numbers of student close gaps and leap ahead.

Think of two students, both starting out two years behind when they start first grade. What if one of them had a great teacher—a teacher in the top quarter of all teachers—every year in math? At the end of middle school, that student with the excellent teachers wouldn't be behind any more, and in fact he'd be two years ahead of grade level. An honors student.

Even if the other student had good, solid teachers consistently, and made about a year's worth of progress each year, at the end of middle school, she'd *still* be two years behind grade level, and four years behind her peer in this picture.

Interestingly, research also shows that teachers who are great at raising students' test scores also excel at developing their higher-order thinking.

Technical qualifications matter in STEM, but teaching methods matter, too.



If the supply of technically qualified STEM teachers is limited, and among those teachers some are much better than others—**what can be done to give more students access to *qualified, excellent* STEM teachers?**

Typical tactics include trying to **recruit** more high-potential teachers, ones who were great students in high school and college, and **develop** all teachers on the job.

More recently, **retaining** excellent teachers has gotten buzz. **But to keep *a lot* more top teachers, schools would have to make big changes** in the things about teaching that *high-fliers care about most, including STEM teachers:* **Career advancement that's well paid**, and not just through temporary grants. And **opportunities to learn on the job** from really outstanding peers.

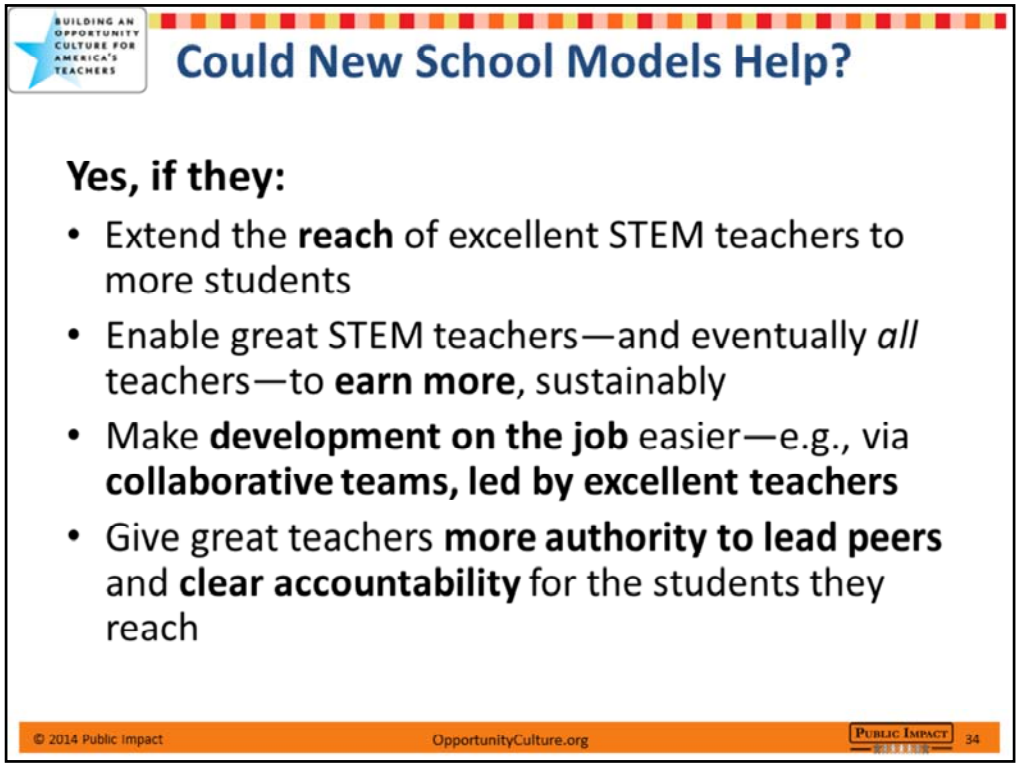
Dismissing truly ineffective teachers also has gotten much attention. But even places that have made enormous efforts are removing only the very worst teachers, leaving in place many who really aren't helping students learn.

Even five consecutive years of amazing efforts nationwide to recruit and retain more teachers using traditional methods would leave most classrooms *without* an excellent teacher. Doubling the recruitment of top talent, cutting top-teacher attrition in half, and tripling the dismissal of the least effective teachers would still leave about 60 percent of classrooms without excellent teachers—across subjects, not just STEM. And that level of change would be unprecedented.

Additionally, we all have high hopes for professional development, but even *widespread* introduction of professional learning communities has not produced significant learning gains, unfortunately.

It's not that these strategies aren't important, even vital—they are. But alone they are not enough. And to achieve them, we need far bigger changes in our schools and the profession.

Source: Hassel, B. C., & Hassel, E. A. (2010). *Opportunity at the Top: How America's best teachers could close the gaps, raise the bar, and keep our nation great.* Chapel Hill, NC: Public Impact. Retrieved from http://www.opportunityculture.org/images/stories/opportunity_at_the_top-public_impact.pdf

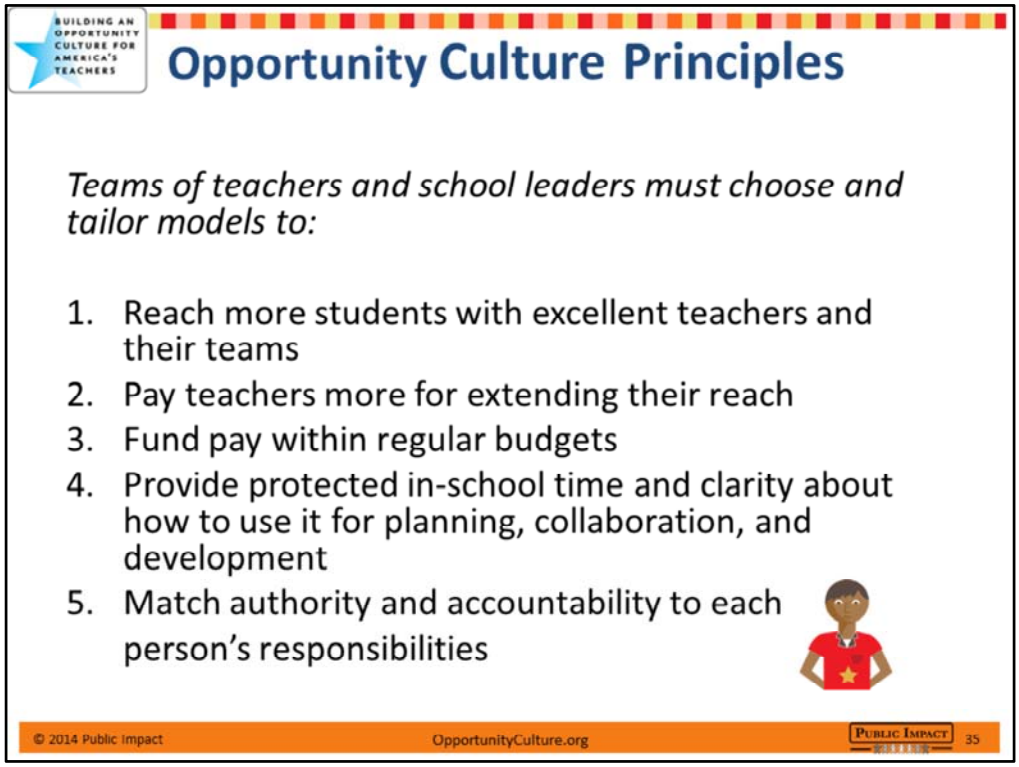


A new approach is using new school models that extend the reach of excellent teachers—in STEM and other subjects—to more students, using job redesign and age-appropriate technology to save teachers time.

These are the basis of what we call the five Opportunity Culture Principles, and they are the foundation of all the school models in what we call an "Opportunity Culture."

Today, school teams with teachers on them are choosing and honing models within these parameters in pilot sites nationally.

See http://OpportunityCulture.org

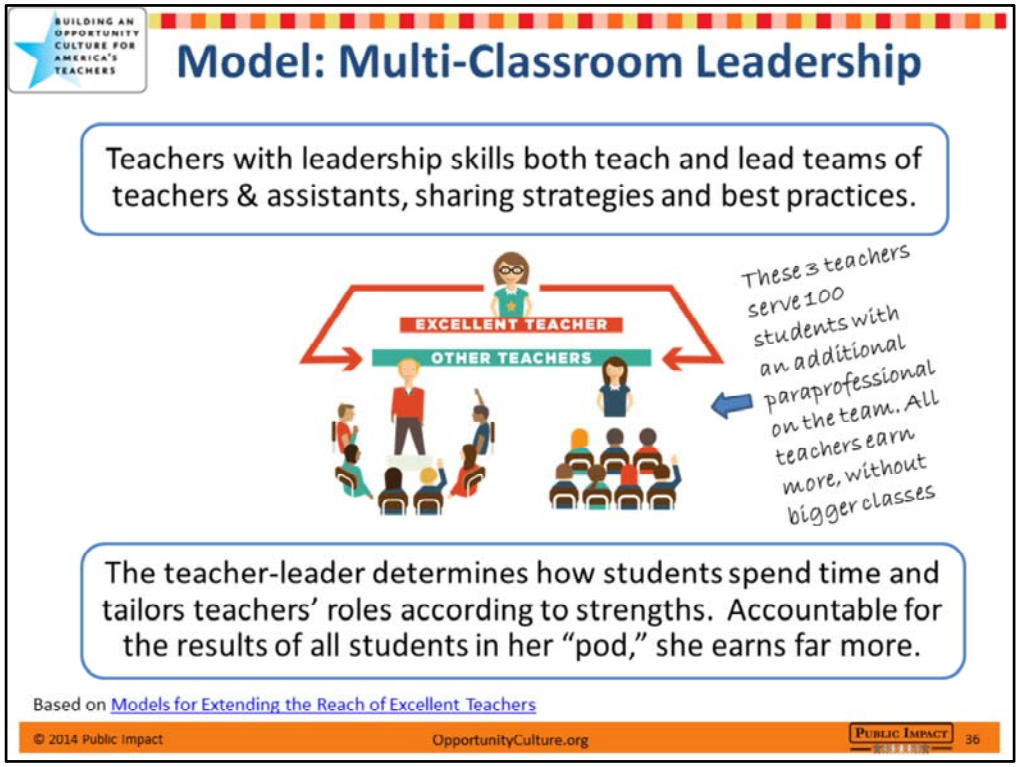


Teacher-administrator teams in each school select and tailor school models that meet the five principles you see here**. School teams can develop their own models as long as they are within these five Opportunity Culture Principles**.

Most districts implementing these so far set a high bar—much higher pay and much greater reach of excellent teachers. This creates more opportunities for team roles that let good, solid teachers earn more, too, not just the best.

All of these changes would address challenges of STEM teaching today—the scarcity of talent, low pay, lack of development on the job, and the shortfall in great school leaders who appreciate the importance of STEM subjects.

Let's look at more about how these new models work.



[OpportunityCulture.org has more slides with greater detail; if you are sharing these, tell your audience].

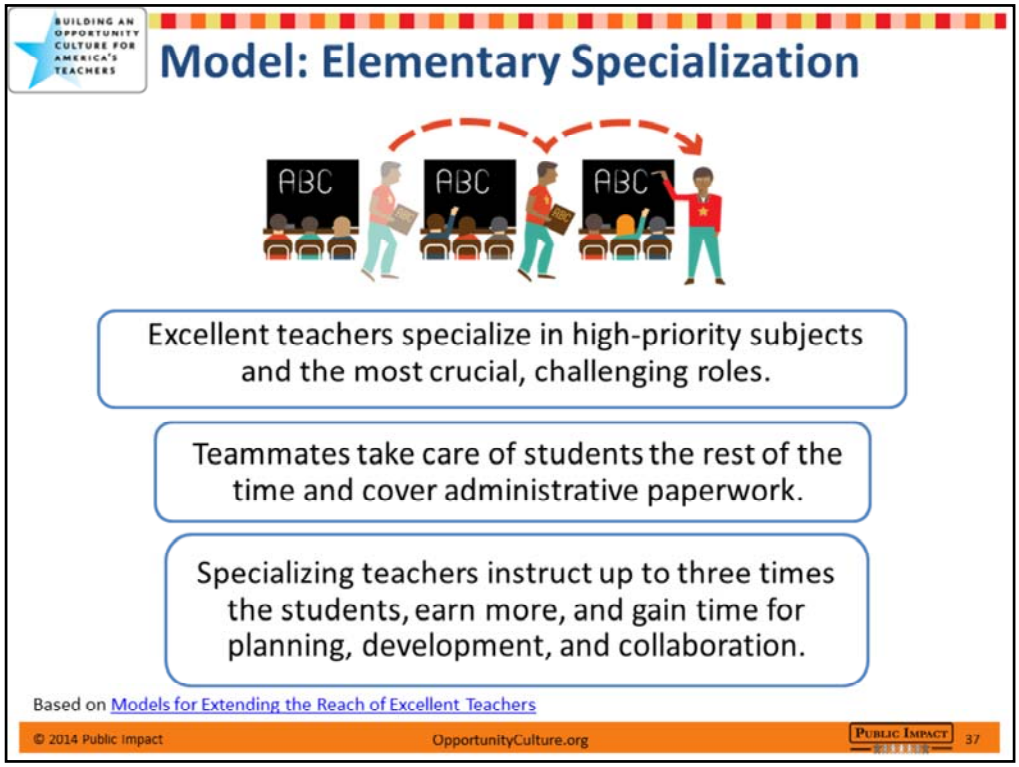
First, Multi-Classroom Leadership. **In Multi-Classroom Leadership, teacher-leaders lead teams of teachers and paraprofessionals.**

With full accountability for all students in multiple classrooms and explicit authority to lead teams, multi-classroom leaders have an enormous incentive to develop other teachers and help them discover and use their strengths.

Team teachers have an incentive to want great new teachers on their teams, because when teams are high-performing in a school, fewer supplemental instructional positions are necessary, freeing funds for higher teacher pay for team members, not just leaders. Resource teachers can return to classrooms, *with higher pay*. Paraprofessional support on teams also saves money for higher teacher pay, and saves time for teacher collaboration.

Schools typically can increase multi-classroom leaders' pay by 50 percent, or more, within budget. When schools implement this schoolwide, *all* teachers can earn more, even when the multi-classroom leaders earn far more.

In this model, *many* more students experience great teaching. **If a district or school wants to ensure that truly all students have access to excellent STEM teachers, Multi-Classroom Leadership, alone or in combination with other models, is crucial.**



In Elementary Specialization, teachers specialize in their best subjects or subject pairs—math and science, or language arts and social studies, for example.

Meanwhile, paraprofessionals take care of students during lunch, recess, transitions, and basic skill practice or project work time—developing their social and behavioral skills, and completing noninstructional paperwork for teachers.

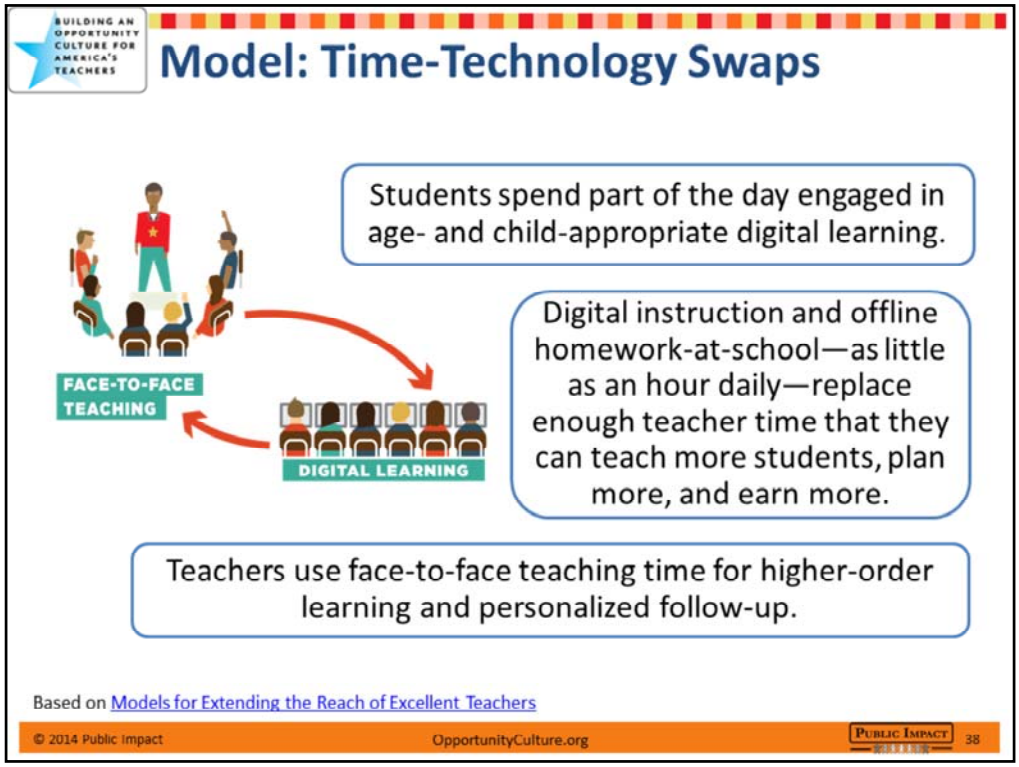
Research indicates that, even in traditionally organized schools, having teachers specialize in their best core subjects would likely produce a significant increase in student learning.

This model *also* adds new paraprofessional support to increase reach, teacher pay, and time for team collaboration.

Specializing teachers can earn about 20 to 40 percent more, within budget.

Two to four times the number of students have excellent teachers. Great elementary math teachers can cover up to four classrooms' worth of students, or three classrooms' worth while adding significant time to plan, review student work, and coach other teachers.

This model alone reaches far more students with excellence, but **it must be combined with Multi-Classroom Leadership to ensure that *all* students are reached with excellent teaching** in all core subjects.



In Time-Technology Swaps, students spend a portion of time learning digitally—as little as an hour daily. This lets teachers teach more students without needing to increase class sizes, for higher pay, without reducing higher-order instructional time. If scheduled correctly, teachers can gain planning and collaboration time, too.

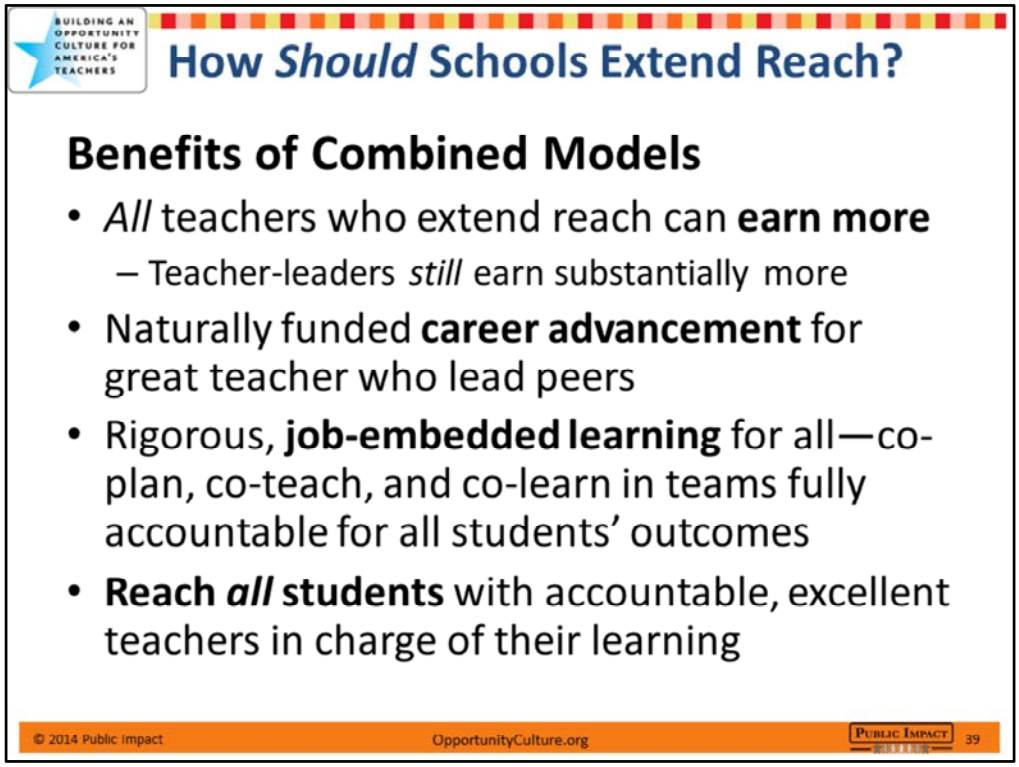
Teachers can earn about 20 to 40 percent more, within budget.

Students actually do not have to spend all of their "digital learning" time online. They also can engage in offline skill practice, project work, and "homework" in a conducive learning environment. Some schools are taking this approach.

This model alone reaches far more students with excellence, but **it must be combined with Multi-Classroom Leadership to ensure that *all* students are reached with excellent teaching** in all core subjects. With this combination, STEM teacher-leaders *and* team teachers can earn more, and all students can experience excellent teaching.

Again, proper scheduling is crucial.

Note: If any of you are secondary-school teachers or working with secondary schools, here's an important point: Schools can **manage secondary teachers' student loads by limiting the number of reach-extended classes each teacher has**. For example, a secondary STEM teacher can reach 50 percent more students *and* gain 7 to 8 hours, or more, weekly of new planning time, if students learn in a lab every other day in core subjects.

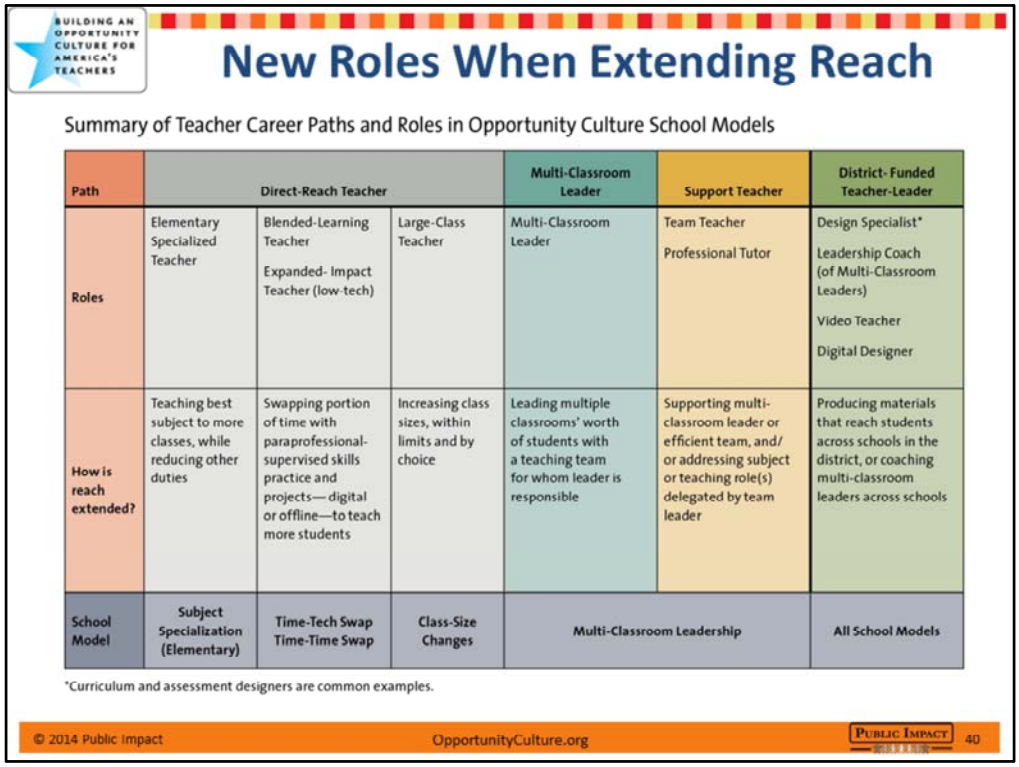


So, there are a lot of options for creating paid career paths *and* reaching more students with great teaching. But **how *should* schools extend teachers' reach?**

Well, we'll learn a lot as more schools implement these models about what works for students.

Meanwhile, models that combine team leadership with direct-reach roles offer the best of both worlds: immediate help for *all* teachers to learn on the job and earn more right away, and immediate chances for *great* teachers to lead and develop others.

Most important, more students gain access to excellent teachers faster when combining models.



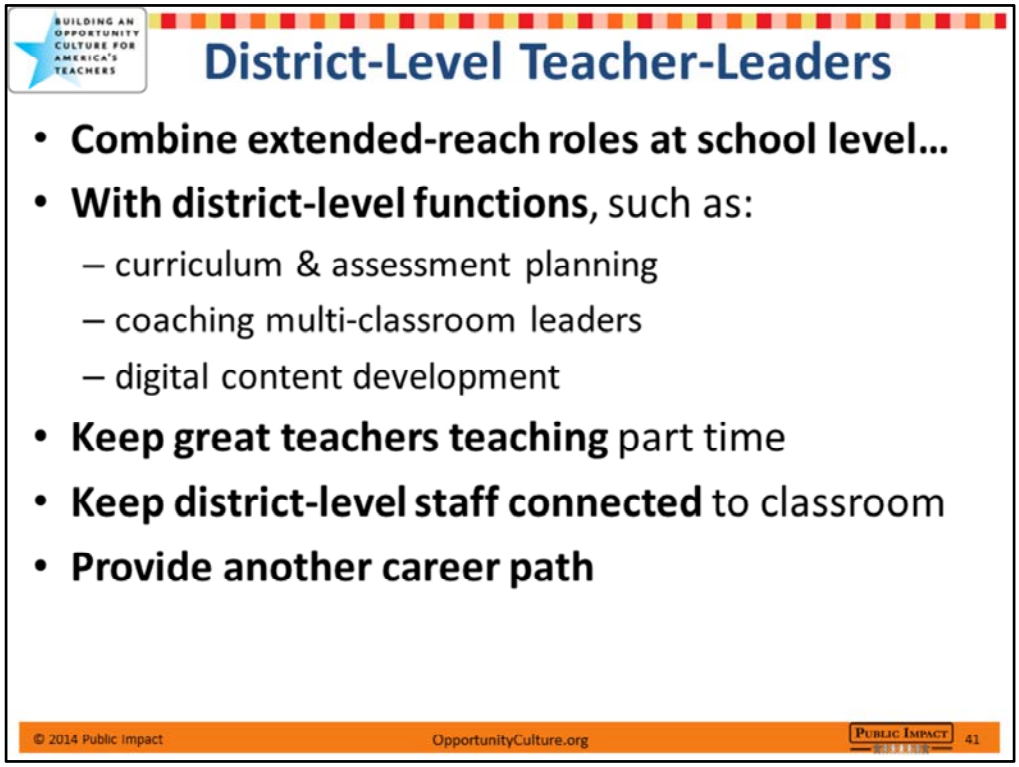
Here we can see that **each reach model has specific teaching roles and ways that teachers reach more students**. These roles are the foundation of career paths.

Some of the roles let teachers reach more students directly: Elementary specialization, blended-learning and expanded impact roles, and teaching slightly larger classes.

And one, Multi-Classroom Leadership, lets teachers help more students by *leading other teachers* and paraprofessionals/assistants who support the team.

A small number of teachers can pursue district-level teacher-leader roles. The next slide tells more about that.

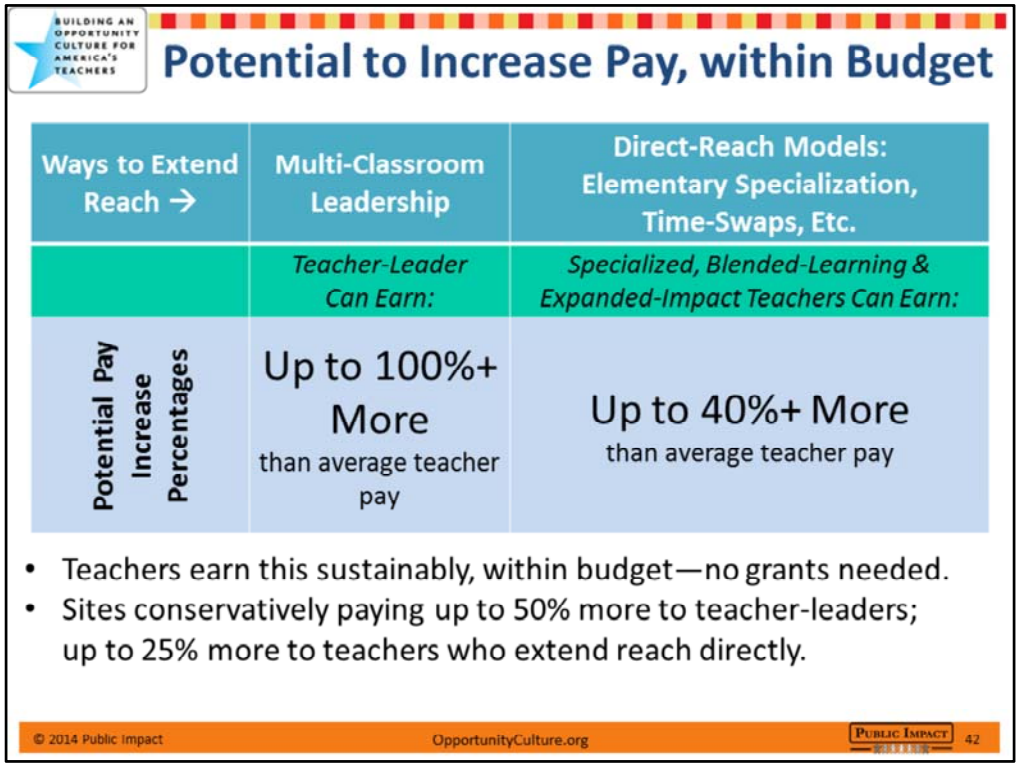
[See slide for detail on major paths.]



In an Opportunity Culture, there are a much smaller number of district-funded teacher-leader roles, often called *hybrid* roles, such as curriculum and assessment developers, multi-classroom leader coaches, and digital instruction developers.

When these **teachers continue to teach *part time* in extended-reach roles at the school level**, they can also earn more.

This provides **yet another career option for great teachers who want to keep teaching**.



All the reach models enable pay increases for STEM and other teachers. Using national averages for these cost factors, **we calculated ranges of expected percentage pay increases** that schools could give teachers if they used these models, completely within budget.

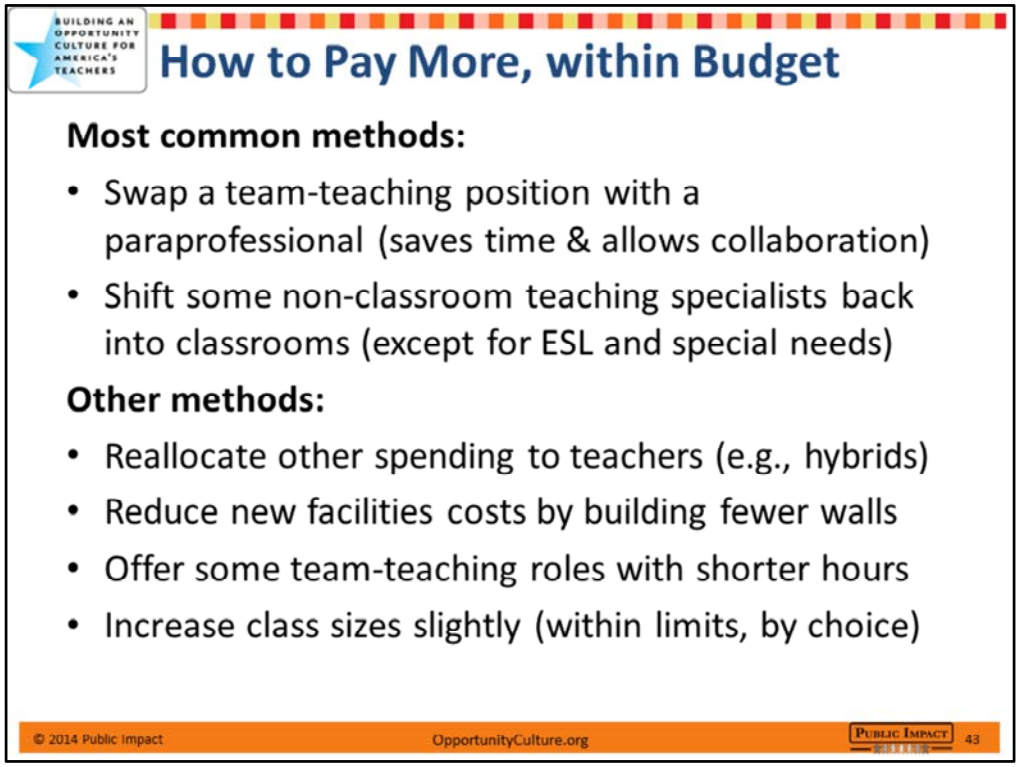
These are approximate and vary by local cost factors and school design decisions.

Hybrid role pay depends on how they are blended with these roles and the funding for those positions at the district level.

Schools must make wise and careful use of teachers' time and talents, and let the newly freed money flow into teachers' pockets.

Pilot schools are being cautious, but even so are already paying teacher-leaders up to 50 percent supplements above average teacher pay, and other reach teachers supplements of up to 25 percent.

The first district site to scale, Charlotte-Mecklenburg Schools, is offering pay supplements to ***effective*** teachers and paraprofessionals who join reach teams, too, not just the very best teachers. We expect other sites to do that as well, since paying for teamwork encourages collaboration and on-the-job learning by all.



Here's a summary of how reach models allow schools to pay teachers more within budget, including STEM teachers.
The first two are the most common so far in Opportunity Culture schools:

- **Swap a team-teaching position with a paraprofessional**, to save teachers time and enable schedule changes that let teachers collaborate and improve during school hours. Paraprofessionals can do the team's administrative paperwork and routine instructional tasks, such as grading against rubrics. They also can supervise students' digital learning, offline skill practice, and project work. Teachers direct their work. The difference in labor costs, minus any new technology costs, funds higher pay for team.
- **Reduce the number of supplemental non-classroom specialist positions** that have proliferated in recent years. Even leaving all special education, ESL (English as a Second Language), and family support positions intact, most schools can save a lot by letting academic specialists return to classrooms, in higher-paid reach roles. The saved money funds higher pay for teachers and their teams who reach more students.

Schools can use also other means to increase teacher pay:

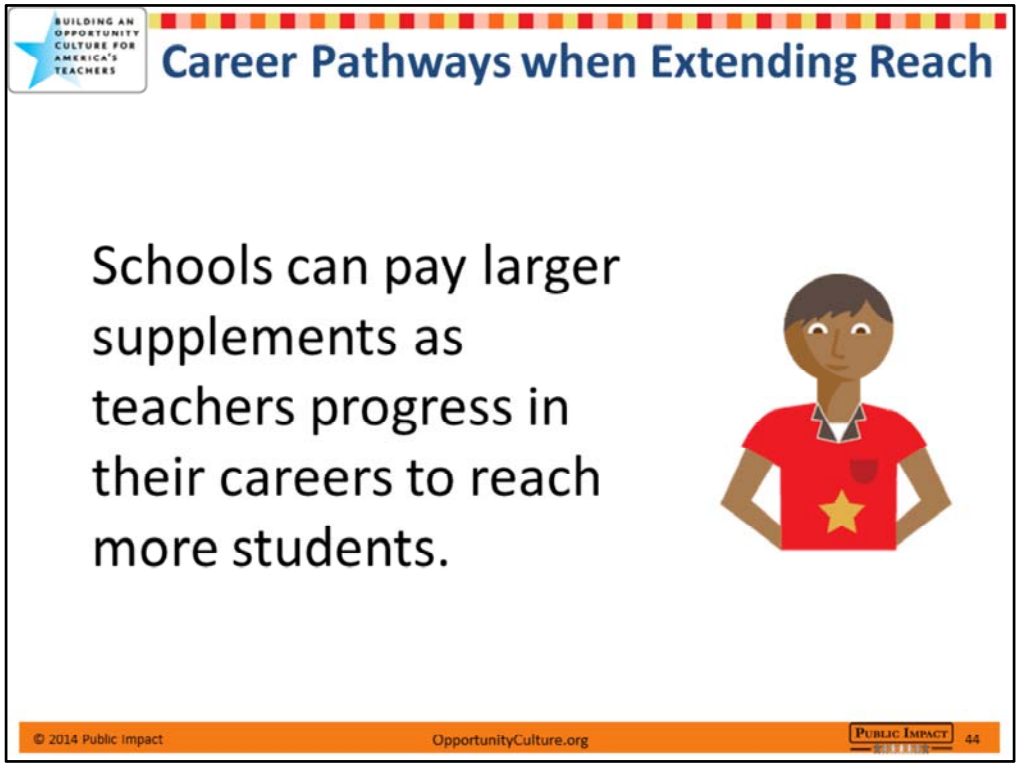
- **Reallocate other spending** to pay classroom teams and team leaders more. For example, many districts spend large sums on *professional development* that could be used to enhance the pay of multi-classroom leaders or coaches for these teacher-leaders, whose responsibilities include developing whole teams of teachers. Hybrid positions can earn more in part through these reallocations.
- **Decrease the number of walls**. Time-Technology Swaps that use digital labs or larger

classroom spaces have fewer walls. This decreases construction costs in new schools.

- **Offer teaching roles with limited hours**. According to the National Center for Education Statistics, teachers work an average of 50 to 55 hours weekly. In other professions, there are roles with predictable 40-hour workweeks, for less pay. Some teachers might choose similar roles that allow them to play more limited teaching roles or work shorter hours. These roles can preserve funds to pay other team teachers more, and allow both good and great teachers who need shorter hours for personal reasons to continue teaching. Teachers in our early focus groups asked us to include this option. Many saw the need for it at various stages of their personal lives.
- ***Thoughtful* class-size increases**. Of course, it's easy to see how larger classes—even slightly larger—generate funds per pupil that can be used to increase pay, because fewer teachers are needed overall. This option does need to be used thoughtfully, depending on the class sizes you already have, student needs, and the classroom management skills of each willing teacher. Pilot schools so far have used this *only* in combination with other models, such as Time-Technology Swaps, that simultaneously decrease instructional group size.

So in summary, all of the reach models can save money that returns to teachers who extend their reach. Schools have many options and can thoughtfully choose ones that fit.

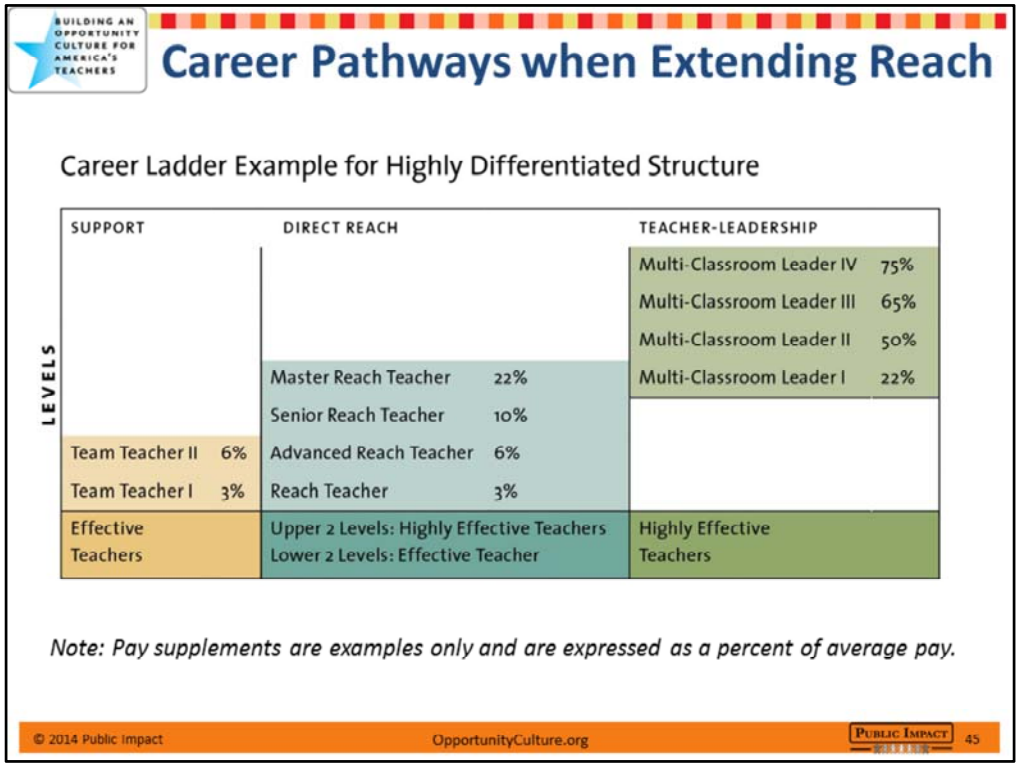
You can find pay and budget analyses to help in the **Pay Teachers More** section on **OpportunityCulture.org.**



All of the reach models produce natural career paths for teachers. Within any given school model, the greater the reach, the greater the pay, as long as teachers can maintain their effectiveness or excellence.

Districts can develop career paths that pay for the added responsibilities that come with additional reach, commitment to or experience on reach teams, and excellence in teaching. All three of these become possible within budget when using Opportunity Culture models.

Note: Some teachers may struggle a bit with these roles at first—teacher preparation programs rarely prepare teachers for team teaching, team leadership, or advanced planning skills for reaching more students. Developing the right training, both for teachers in preparation programs and for teachers immediately before assuming advanced roles, is the next frontier. The goal is for excellent teachers to slide into these roles fluidly, while maintaining student outcomes and helping other teachers achieve excellence, too.



Within each school model, reaching more students increases pay. This is an example of a highly differentiated pay scale. Entry into advanced roles is based on teaching excellence, leadership, reach, and experience in, or commitment to, extended-reach roles.

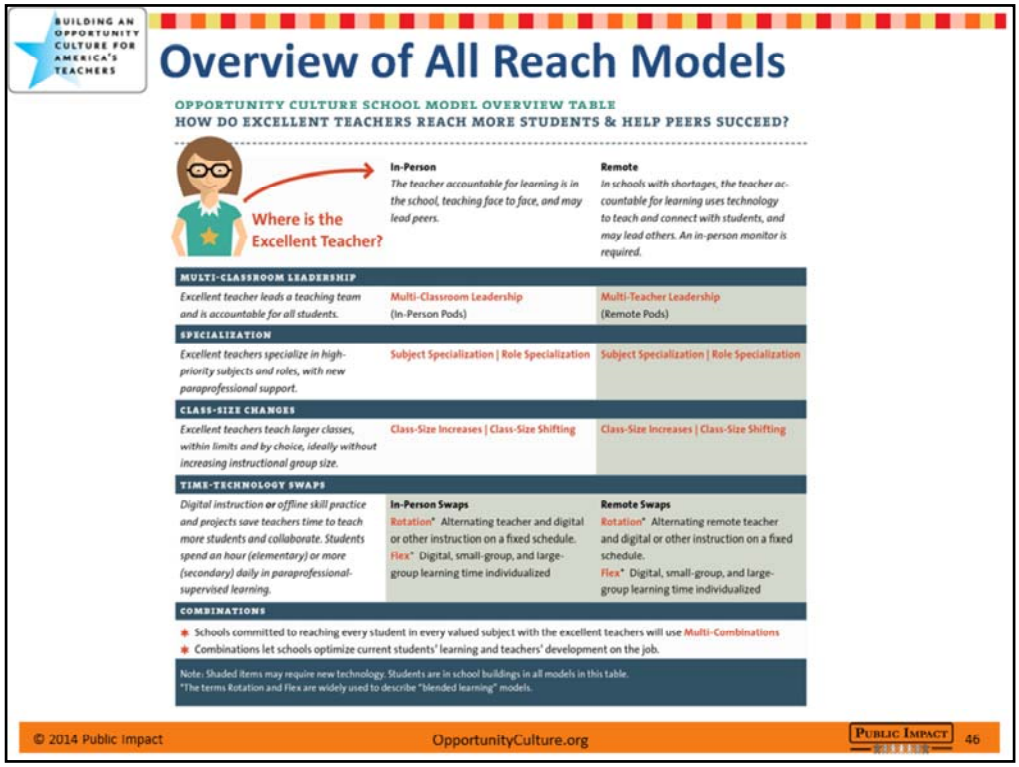
Specific pay progressions will depend on local factors such as:

- **wage differentials** between teachers and paraprofessionals,
- **the number of supplementary, non-classroom instructional specialists** a school has,
- **the cost of new technology** (some schools already have all they need, others do not),
- **whether each district prefers more differentiated career advancement paths or "flatter" paths** with fewer levels, and
- **state policies that affect whether schools may keep their full funding to pay teachers more** for advanced roles.

Pay supplements for district-level teacher-leader roles, which are not included on this slide, depend on how they are combined with school-level, extended-reach roles and those district-level roles. These **hybrid teacher-leader roles can also have a career path that includes increasingly advanced positions, instead of just one-off roles**.

We have a detailed guide to designing these paths, which lays out all the options and decision factors, on OpportunityCulture.org.

So, what you can see in all of these slides is that schools and districts using these models can offer **more than higher pay** to their teachers:
They can offer a **diverse array of career opportunities**—many different ways to advance, all without leaving teaching, and all funded by regular budgets rather than temporary grants.



To see the full range of options, you can go to the Redesigning Schools page of OpportunityCulture.org, where you will find this table. You can click through to see short descriptions of all these models as well as combinations.

For example, districts with extreme shortages of some teachers—like in advanced math and science courses—may want to consider **remotely located teachers**. We do not cover that option, but rural schools and schools with teacher shortages in any location may want to consider this option.

So, all the options we know about are here, and we'll keep updating this, and eventually narrowing the range to reflect what's working best in schools.

In addition to giving more students access to excellent teaching right away, especially in schools and subjects like STEM with shortages, we expect that these models will have other effects that create a "virtuous cycle" in which:

Opportunity for **career advancement while teaching** and rigorous, **on-the-job learning** become possible when fully accountable, excellent teachers advance by *leading, collaborating with, and developing peers in teams* to reach more students.

- Co-teaching on teams where excellence is acknowledged provides authentic on-the-job learning and enables a team's teaching to rise to the level of the most skilled teachers in each instructional area.
- Paraprofessionals scheduled correctly enable these teams to collaborate during school hours and reach far more students.

Pay that is substantially higher becomes possible, without forcing class-size increases, when teams reach more students than is possible in today's one-teacher-one-classroom mode.

- Less-costly paraprofessionals save teachers time for reach, and academic resource teachers shift into fully accountable teaching roles, making teacher pay increases of 20 to 130 percent possible.
- Reallocation of *other* spending to higher teacher pay is also crucial to achieve six-figure average pay.

Selectivity about who enters and remains in teaching becomes easier when schools offer the engaging, developmental, financially rewarding jobs with outstanding peers that high-performers want.

When good teachers benefit developmentally and financially from having great peers

One that is focused on superior learning.
One that rewards teachers generously.
And one that is financially sustainable for schools.

It's an important goal for all schools and all valuable subjects, but this vision has particular promise for addressing shortages in schools and subjects, such as STEM, with chronic shortages of excellent teachers.

The importance to our children and nation of embracing this vision—and focusing on **giving every student access to excellent teachers consistently**—cannot be overstated.

Additional Resources

For more information on school models that extend the reach of excellent teachers and teaching teams, please visit www.opportunityculture.org

- Reaching All Students with Excellent STEM teachers: Education Leaders' Brief—companion brief to this slide deck
- Teacher Pay and Career Paths in an Opportunity Culture—design guide for districts
- Two-pager for teachers—just imagine a profession like this
- Redesigning Schools—summarizes reach model options
- School Models—model details and schedules
- How to Pay Teachers More—within budget while giving more students access to excellent teachers
- Teacher Career Paths—sustainable, paid career advancement using reach school models
- Tools for School Design Teams—regularly updated list of all OC materials
- Selection, Development, & Evaluation Tools

See OpportunityCulture.org for a list of current funders of this initiative.

Acknowledgements

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