

Get the Facts Out:

A user-friendly

guide to engaging people

in discussion about

careers in secondary

math and science teaching

This toolkit was lovingly created by a dedicated group of changemakers as part of a 100Kin10 Project Team.

Project Team Partners

*Learn more about partner organizations and their respective resources for teacher recruitment in the [Additional Resources](#) section.

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This toolkit is designed to help math and science educators at the university, college, and high school levels have more inspired conversations with students, colleagues, parents, and the general public about careers in grade 7-12 math and science teaching. It will help you to have productive conversations that enhance the perception of math and science teaching as a professional career choice, build enthusiasm for pursuing a career in the field, and ensure that the teaching pipeline can address every child's need for high quality and equitable access to math and science education.

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Section 1

Introduction

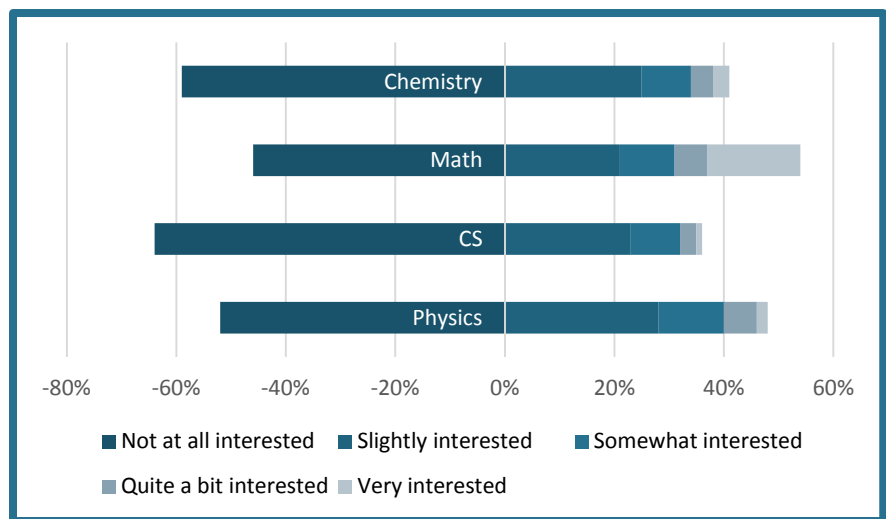
GET THE FACTS OUT:

Painting an Honest Picture about Teaching

The nation needs more secondary math and science teachers. Research shows that nearly half of STEM majors have an interest in becoming a teacher.

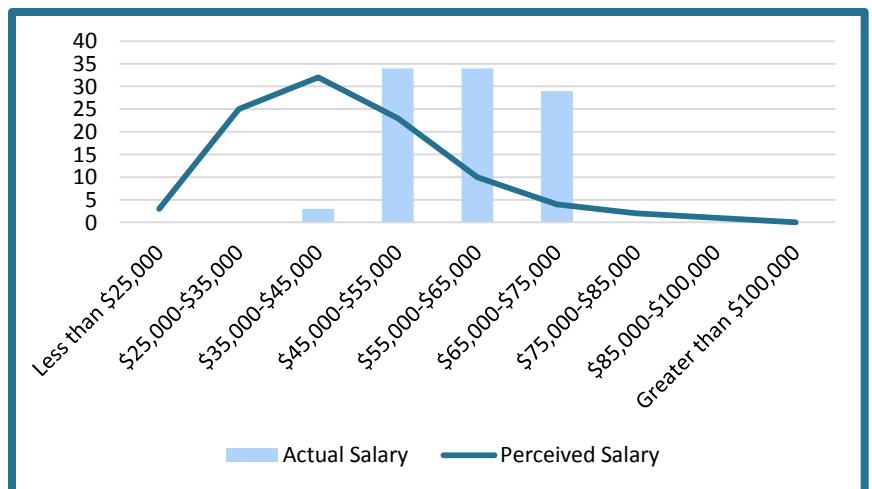
What is happening?

Undergraduates respond to the question “How interested are you in being a middle or high school teacher?” (POPA Report, 2017)



Recent research on students' perceptions of teaching as a career has found that a large fraction of these students who express an interest in teaching, have misperceptions about teaching as a career which preclude them from considering it a viable career option.

Perceived and actual teacher salaries. The line shows perceived salaries and the bars show average salaries in respondents' states (POPA report, 2017)



Students are most inclined to consider teaching as a career in departments where faculty discuss teaching as a career option. (POPA Report, 2017)

We encourage you to use this booklet and its various templates and tools to help you start the conversation about teaching as a profession and to arm you with correct information based on surveys of science and math graduates, research on student perceptions, and published data on salaries and benefits for teachers.

The U.S. public has strong perceptions about teaching as a career. Many of these perceptions are not based on fact and are actually misperceptions or myths about the profession.

We have found that a shift in the way people think about math and science teaching towards more factual information increases the number of students interested in teaching as a career, which we believe, can have a dramatic impact on the quality and quantity of mathematics and science education in the nation.

Here are a few examples of myths about teaching:





Myth #1	Myth #2	Myth #3
Teaching pays a lot less than other jobs you can get with the same degree.	Teachers can never retire.	Teachers are unhappy.

Myth #1: Teaching pays a lot less than other jobs you can get with the same degree.

Many people do not consider a career in teaching because they believe their earning potential is higher in other careers. They believe that starting salaries are low and that a degree in math or science education is not worth the investment.

Myth #1	Myth #2	Myth #3
Teaching pays a lot less than other jobs you can get with the same degree.	Teachers can never retire.	Teachers are unhappy.

To investigate this myth, let's take a look at four profiles of actual secondary math and science teachers.

 <p>Teaches: 10th/11th gr. math In a public school Years of Experience: 1 Education: Bachelors + 0 Location: East Peoria, IL Salary: \$30,300 Benefits: Medical premium: \$250 Pension: 13% of salary, paid by employee Monthly Rent: \$600</p>	 <p>Teaches: 9th gr. science in a public school Years of Experience: 2 Education: Bachelors + 0 Location: Greeley, CO Salary: \$42,663 Benefits: Medical premium: \$40 Pension: 8% of salary paid by employee; 12% paid by district Monthly Mortgage: \$1,533</p>	 <p>Teaches: 8th grade chemistry in a private school Years of Experience: 8 Education: Bachelors + 0 Location: Washington, DC Salary: \$50,000 Benefits: (unlisted) Monthly Rent: \$1,600</p>	 <p>Teaches: 12th gr. physics in a public school Years of Experience: 18 Education: Masters + 60 Location: Crystal Lake, IL Salary: \$102,278 Benefits: Medical premium: \$250 Pension: 11% of salary, paid by school district Monthly Rent: \$1.050</p>
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Teacher salaries are highly variable. Broad analyses of average or median teacher salaries can be deceiving, especially in school districts where the majority of teachers are early in their careers. Many factors influence teacher salary, including the following:

- **Cost of Living:** Teachers in urban and suburban communities are more likely to have a higher base salary as compared to teachers in rural communities.
- **Public/Private Salary Systems:** Most public schools have fixed salary scales that increase base pay annually due to inflation, experience, education, and additional job responsibilities. These salary tables are publically available and typically easy to find

online. Some schools, especially private schools and high needs communities, may allow salary negotiation and signing bonuses.

- **Experience:** Teachers are typically rewarded for each additional year of experience with a salary increase.
- **Education/Certifications:** Teachers typically receive salary increases for additional graduate credits related to their teaching assignment, and some schools reward teachers financially for receiving National Board Teacher Certification.
- **Additional Job Responsibilities:** Schools frequently offer additional salary for serving in leadership positions such as department chair/lead, as a mentor to new teachers, and for supporting students through academic and extracurricular coaching. Additional pay amounts are also publically available.
- **Economy:** Local, state, and national economies can strongly influence base salary pay.

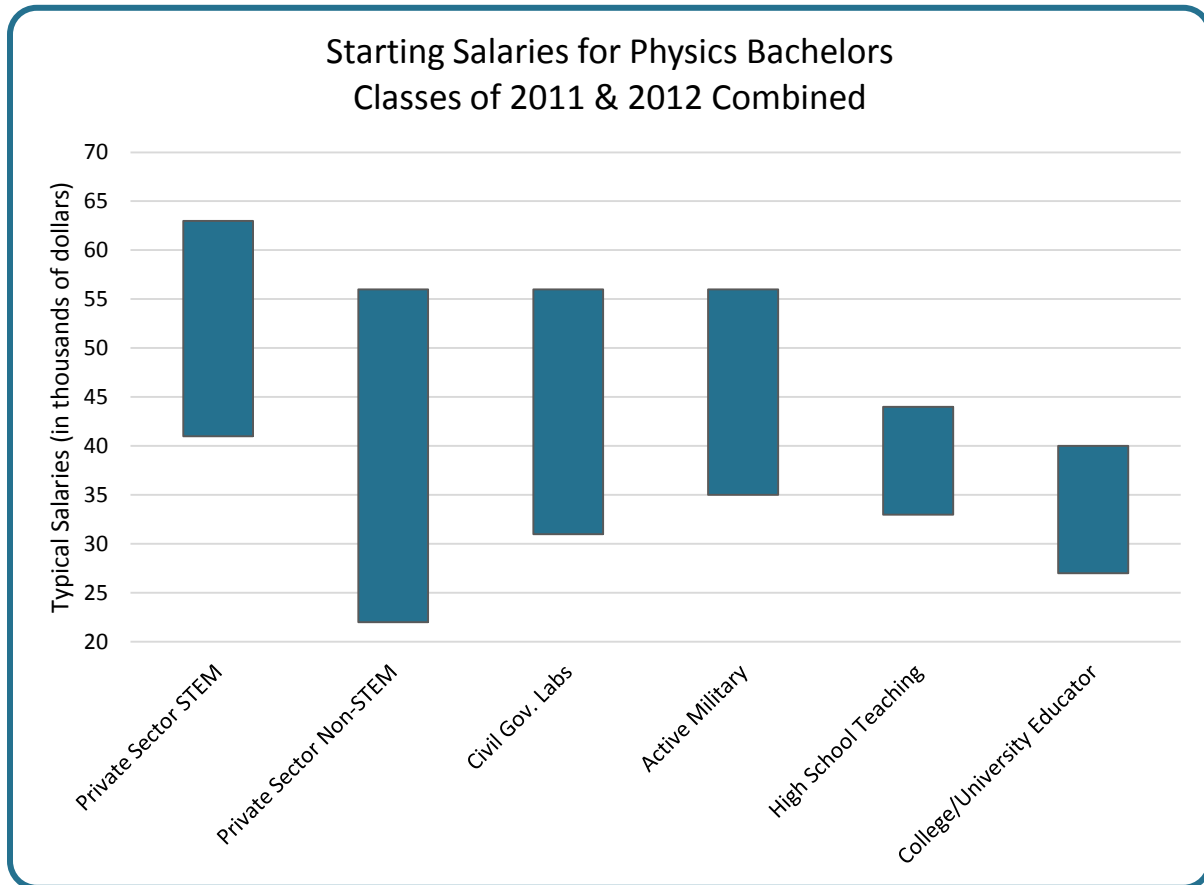
There are many hidden financial benefits to teaching that go beyond salary. These benefits can include the following:

- **Flexible Non-Contact Time:** Most teacher contracts oblige teachers to ~180 days of contact time with students, allowing teachers to use extended school breaks for professional growth and personal time.
- **Family-Friendly Work Hours:** Many teachers are able to sync their official work day with their own children's school hours, and be present with their families during the summer and academic year breaks, saving thousands in childcare costs.
- **Regular and Reliable Schedule:** School schedules are set and published before the school year begins making it possible for teachers to schedule their personal time in advance. It is not uncommon for employees in private industry to learn about travel or other scheduling commitments a few short weeks in advance.
- **Student Loan Forgiveness:** There are Federal Student Loan Forgiveness programs for teachers for Direct Subsidized, Direct Unsubsidized, and Perkins Loans. See <https://studentaid.ed.gov/sa/repay-loans/forgiveness-cancellation/teacher> for current information. Direct Subsidized and Unsubsidized Loans allow up to \$17,500 for teachers who are a highly qualified math or science teacher in a high needs secondary school after completing 5 consecutive years of teaching. Perkins Loans offer up to 100% cancellation prorated by year: 15% /year years 1 and 2 (includes interest accrued during the year), 20%/year years 3 and 4, and the final 30% after year 5. Deferment for Perkins Loans is available while teaching full time math or science.
- **Tuition Reimbursement:** Some schools provide reimbursement to teachers who opt to take graduate coursework, allowing them to pursue graduate degrees at little to no cost. In turn, the additional earned credits or degrees can result in an increased salary.
Note: There are graduate programs designed for practicing teachers while teaching full

time. These programs utilize online coursework and offer some coursework during the summer.

- **Pension and Retirement:** Most public schools offer pension or retirement packages that allow teachers to retire early (before age 65) and to maintain a significant amount of their income even after they stop teaching.

Comparison with other professionals who have similar types of education:

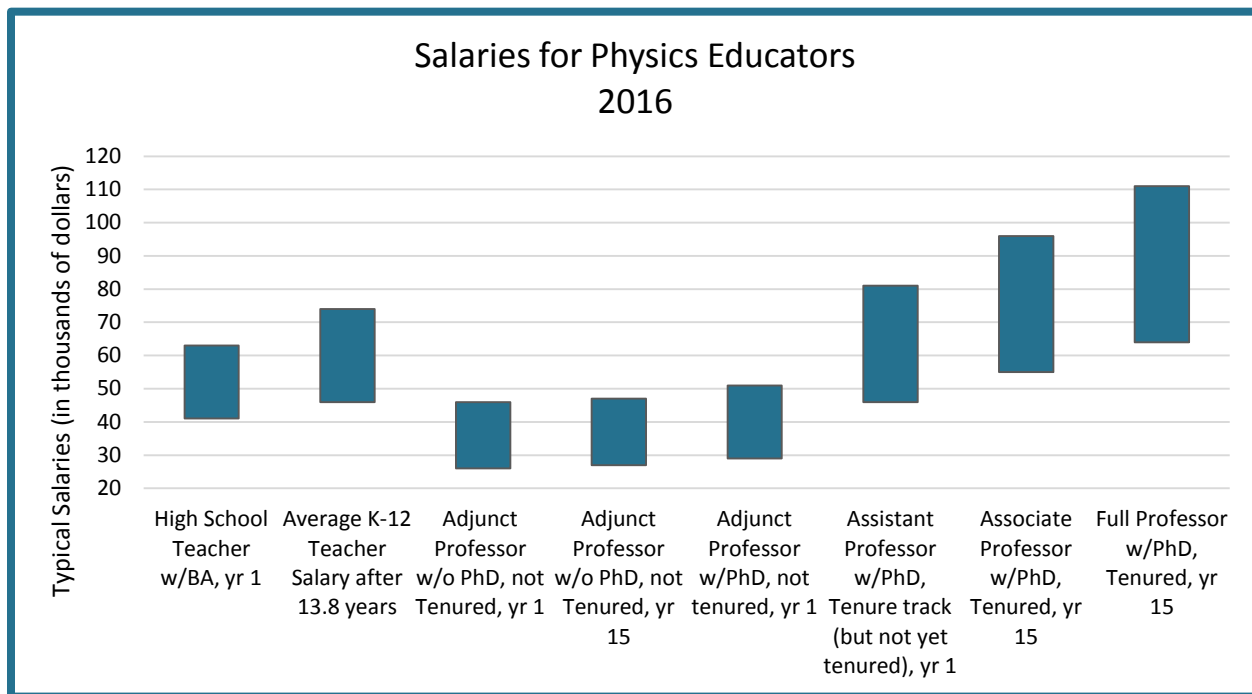


* American Institute of Physics Statistical Research Center, 2011 & 2012.

A study that considered graduates with a bachelor's degree in math, chemistry, and physics found that the highest earners are those with a physics degree (Citation). In contrast, high school teachers within any given public school typically earn the same salary, regardless of their discipline specification.

Comparing earners of a bachelor's degree in physics across all sectors, **high school science teaching is placed near the middle of the pack for starting salaries.** Considering teachers are typically on a 9-month salary, a more fair comparison, which considers the amount of money a

teacher could earn during the summer months or for other activities/employment, significantly increases the potential for earned income.



* American Institute of Physics Statistical Research Center, 2016 & National Center for Education Statistics, 2012 (for average K-12 teacher salary).

It is also worth considering the comparison between secondary and college science teaching. Data from the American Institute of Physics in 2016 demonstrates that there are significant discrepancies in how much an educator earns. Experienced middle and high school math and science teachers far outpace their equally-experienced adjunct and non-tenure track faculty in salary at the university level, and K-12 teachers earn on average \$2,500 in additional income for coaching, administration, and other work, not including funds earned from teaching during the summer (National Center for Education Statistics, 2012).

While the economic situation for secondary teachers may not be as dire as many people believe, we would be remiss if we did not explicitly state that we would love to see teachers be paid more for the invaluable contributions they make to our society.

Myth #2: Teachers can never retire.

There is a widespread perception that secondary teachers cannot build a nest egg for retirement, unlike their counterparts in private industry.

Myth #1	Myth #2	Myth #3
Teaching pays a lot less than other jobs you can get with the same degree.	Teachers can never retire.	Teachers are unhappy.

Teaching vs. Industry

Teaching

Salary + Retirement Benefits
 Mid-Career Salary + Benefits

- Early: \$43K+ \$17K = **\$60K**
- Mid: \$75K+\$17K = **\$92K**

Contract

- 9-month contract
- 74 days not on contract
- Retire late 50's with 87.5% of HEI

Lockheed Martin

Salary + Retirement Benefits
 (4% contribution into 401K)

- Early: \$66K + \$3K = **\$69K**
- Mid: \$78K + \$3K = **\$81K**

Contract

- 12-month contract
- 10 – 40 days off
- Retire at 65 salary depends on market performance & life expectancy

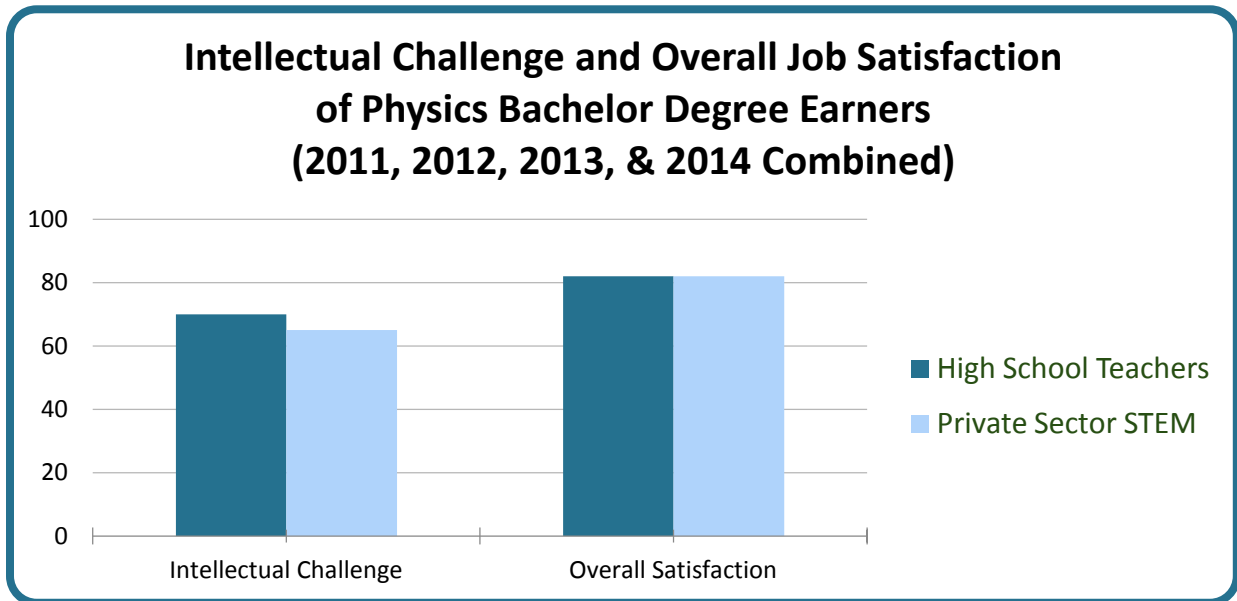
The chart to the left compares secondary math and science faculty in central Colorado with the salary and retirement benefits of an employee of Lockheed Martin. While employees in private industry frequently earn higher salaries early in their career, teachers quickly catch up and can surpass their counterparts in terms of earned benefits. Further, public pension systems provided through many secondary schools allows teachers to have a greater sense of retirement security, regardless of market performance or economic situations.

Myth #3: Teachers are unhappy.

The public perception of a teacher’s working conditions leads many to believe that teachers are dissatisfied with their choice of career. While there is great variability in a teacher’s work conditions and personal circumstances, the vast majority of teachers are satisfied with their career.

Myth #1	Myth #2	Myth #3
Teaching pays a lot less than other jobs you can get with the same degree.	Teachers can never retire.	Teachers are unhappy.

Four years of research done by the American Institute of Physics shows that high school teachers report nearly equivalent intellectual challenge and job satisfaction than their private industry counterparts. In the 2011 and 2012 surveys, high school teachers exceeded private industry employees on both of these measures.



Contrary to popular belief, nearly 80% of grade 7-12 educators remain in teaching after 5 years (DOE Citation). Math and science teachers are also 6x more likely to report that they make a difference in the lives of others, when compared to those in private industry (PoPA Report).

Want a broader picture of what math and science teaching is actually like? Go to [Section 5: About *Get the Facts Out*](#) to learn more about the research that motivated this work.

What you say about middle and high school math and science teaching **matters.**

University and college math and science departments and high school teachers have an important role to play in enhancing the perceptions of high school teaching. The more frequently faculty talk positively about teaching, the more likely students will consider it as a plausible career option. As such, it is essential to provide accurate information about math and science teaching to interested candidates.

Research from the Colorado School of Mines about the perceptions of teaching grade 7-12 shows that misperceptions about the teaching profession are pervasive among university students and faculty. Many of these myths about teaching are also disseminated by STEM professionals in both industry and the classroom. These misperceptions can damage budding students' interest in grade 7-12 teaching at a time when our nation is in dire need of their passion.

Why me?

Math and science teachers prepare the next generation of national and world leaders, and they inspire future science research and mathematical understandings. Everyone has a role to play in preparing the next generation of math and science teachers, and when you have conversations about teaching, it's important to **Get the Facts Out.**

The resources in this booklet are meant to help the following individuals in their roles:

College and University Faculty

Speak frequently and positively about secondary math and science teaching as a career option following a STEM degree, offer an open invitation to all students to learn more about teaching, and encourage them to follow a pathway that leads to teacher certification.

High School Teachers

Speak with enthusiasm about your career choice, including the impact you have on the world, as well as the many tangible benefits that are unique to being a teacher. Encourage students to consider university programs that support teaching pathways.

Section 2

Communication

Principles

How do you communicate about teaching in a way that opens up the space for **productive and meaningful interactions** with students?

Successful communication about teaching uses the following principles:

1. Connect around shared values and lived experience
2. Acknowledge concerns and address potential misperceptions
3. Establish context and credibility
4. Avoid common pitfalls

To create powerful messages, you have to first listen to your audiences. Over the last few years, the American Physical Society's Panel on Public Affairs and faculty at the Colorado School of Mines have conducted research to determine the messages that best reflect our audiences' values, experiences, and fears related to secondary math and science teaching.

1. Connect Around Shared Values and Emphathize with Lived Experiences

Getting the facts out about teaching and helping to shift public perceptions about teaching starts with bringing relevance and personal connection to the conversation.

Use these core values as your first “touch” in your preliminary interactions, especially with students who you think might be interested in a career in math or science teaching.

Core Values

Basic math and science skills and understandings are essential for students to have healthy, productive lives.	All students deserve to have good math and science teachers at every stage.	Intellectual rigor and creativity are critical components of a STEM career, and math and science teachers should be recognized for their content and teaching expertise.
The K-12 teaching profession should be respected by practicing mathematicians, scientists, and the wider community.	Teachers deserve to be paid well and have a professionally fulfilling career.	Anyone with interest in math or science should consider a career in K-12 teaching – including the best and brightest students.

Make sure that you focus on the lived experiences that are important to your audience. When speaking to parents, faculty, students, or other members of the community, encourage them to reflect on positive experiences that they have had with a K-12 math or science teacher.

Parents/faculty value math and science teaching when they...

- ...recognize that a teacher helped them or their student/child to be successful.
- ...recognize that a teacher inspired them or their student/child to pursue a career.
- ...understand the challenges associated with being a good teacher.

Students value math and science teaching when they...

- ...have personal positive experiences teaching others.
- ...identify a teacher who has had a positive impact on their lives.

2. Acknowledge Concerns and Address Potential Misperceptions

Students interested in teaching typically know that teachers make a difference. However, that’s often not enough to encourage an interested individual to pursue it as a career path, especially when there are serious concerns or misperceptions about teaching.

Below are a number of concerns often raised by individuals who like the idea of middle or high school teaching, but feel that their concerns outweigh their potential for pursuing or recommending a career in teaching. The first step is to listen, and then to acknowledge the concern, using shared values while leaving room open to address it with tested, fact-based messages:

Concerns	Acknowledgement
<p>“Math and science teaching isn’t really a professional career.”</p> <p>“My parents/professors wouldn’t expect me to become just a teacher.”</p> <p>“My parents/professors/friends will think less of me.”</p>	<p>“Society needs to do a better job of recognizing the value of teaching as the foundation for students’ ability to live healthy and productive lives, and the nation’s advancements in science, technology, engineering, and mathematics.”</p> <p>“It’s important to help our family, friends, classmates, and professors remember the impact that teachers have likely had on their lives, and that teachers spend more time influencing children than nearly any adult other than their own parents.”</p>
<p>“I won’t be able to pay off college debt.”</p> <p>“I don’t want to live in poverty.”</p>	<p>“All teachers deserve to get paid well and be financially able to pursue opportunities that enrich their professional and personal lives.”</p> <p>“Teacher pay is highly variable, and there are often hidden financial benefits to pursuing a teaching certificate and choosing a career in teaching. There are federal loan forgiveness programs and many states offer good retirement plans.”</p>

Concerns	Acknowledgement
<p>“I don’t want to get stuck in a job where I might get intellectually bored or burnt-out after just a few years.”</p>	<p>“Teachers thrive in environments where they receive adequate professional support to work through challenging situations. Unlike many careers, teaching is never the same from class to class or day to day, and flexible summer breaks from classroom teaching allow teachers to pursue their passion for learning in new ways each year.”</p>

In addition to personal concerns, misperceptions are prevalent about the teaching profession. Typically, these misperceptions are overgeneralizations or exaggerations of negative stories individuals have heard about teaching and are not reflective of the very diverse experiences of teachers. Common misperceptions are listed below.

Common Misperceptions

1. Grade 7-12 teaching pays less than other careers using the same degree.
2. Graduating with a degree to teach will result in life-long college debt.
3. Grade 7-12 teachers cannot retire comfortably.
4. A career in grade 7-12 math or science teaching is less satisfying than pursuing a career in industry.
5. People pursuing college degrees in math or science would be under-stimulated by a grade 7-12 teaching job.
6. Grade 7-12 teaching is not an attractive career choice for a math or science major.
7. It is difficult to find a job in grade 7-12 science or math teaching.
8. Teachers are fleeing from schools because the job is so terrible.
9. Teachers spend most of their time babysitting.

After you have made a connection with your audience around shared values and lived experiences, the above common misperceptions can be addressed with fact-based messages.

According to research done by faculty at the Colorado School of Mines, these are the messages that most resonate with STEM undergraduate and graduate students. Tangible benefits of a career are especially important to students, such as the opportunity to make a decent salary, pursue advanced degrees, and be intellectually challenged by their job.

Fact-Based Messages

1. Most people underestimate teachers' salaries by \$10 - \$30 K.¹
2. Many teaching jobs have better retirement benefits than those in private industry.²
3. There are student loan forgiveness programs and scholarships for math and science teachers.³
4. Science teachers report equivalent or greater job satisfaction compared to other STEM professionals.⁴
5. Science teachers report equal or higher intellectual challenge in their jobs than other STEM professionals.⁴
6. About half of all math, physics, chemistry, and CS majors report an interest in becoming a teacher.¹
7. Science and math teachers are in incredibly high demand because of the number of unfilled teaching positions.¹
8. You can get a job almost anywhere as a physics teacher, even outside the U.S.⁵
9. Over 78% of middle and high school science teachers are still in the classroom after 5 years of teaching.⁶
10. Teachers are 6X more likely to say that they make a difference in people's lives than are other STEM professionals.¹

¹ See APS PoPA report <https://goo.gl/5f5GHi>.

² MythBusters research conducted at Colorado School of Mines.

³ See Federal Student Aid at studentaid.ed.gov

⁴ See AIP data at <https://goo.gl/VeLRUh>

⁵ See AAEE data at <https://goo.gl/WYa8Ld>

⁶ See U.S. Dept. of Ed. data at <https://goo.gl/eRkZUE>

3. Establish Context and Credibility

In order to truly connect to your audience, it can't just be about them. To establish a personal connection, you need to **share about yourself** who you are, why you personally care, and what you are doing to make things happen. Otherwise, your content risks coming across as empty rhetoric.

Whether you are speaking to an individual or a whole group, you need to share your goals for communicating and articulate your core content. The guidelines in this document are only useful in as much as they open up the space for you to have meaningful and deep conversations with your audience. Make sure that you are focusing your efforts on your core content, while following the guidelines expressed in the rest of this document.

Tips for establishing context and credibility:

- Explain who you are and why you personally care about K-12 math and science teaching.
- Use a tone that is appropriate for your audience, but also allows your personality to shine.
- Employ humor when appropriate -- it can often defuse tension.
- Share specific case studies that help bring shared values to life.
- Select a communications channel that reflects your goals and needs.
- Point your audience to local, state, and/or national data sources that back up your core messages.

4. Avoid Common Pitfalls

Recognize that your audience has potentially very deep-seated feelings and perceptions about the teaching profession.

Do not expect to shift perceptions after a single “touch” – encourage your audience to be open to continued conversation. Focus your efforts on those individuals who appreciate and value middle and high school teaching, but might have reservations about pursuing or promoting it because of concerns or misperceptions that can be addressed.

Importantly, avoid needlessly emphasizing points with which your audience might fully agree, but which do not directly address their concerns or misperceptions. As you use this resource in discussion with students, faculty, or other members of the community, avoid the following:



DON'T “Heroize” Teachers → DO Make Teachers Relatable

Heroizing teachers occurs when we refer to teachers as exceptional, selfless, or self-sacrificial. While we all certainly know teachers who are heroes, raising the bar in teaching so that it is a profession only for those who are exceptional and completely selfless does more harm than good to both public perceptions of the profession. Talk about teaching in a way that allows your audience to be able to relate themselves or their students to being a middle or high school teaching professional.



DON'T Overly Emphasize the National Need → DO Talk About Opportunities

The nation does need good teachers – especially teachers of math and the physical sciences – but this does not prove to be a major factor in students’ decisions to pursue the career. Rather, focus on workplace competitiveness and the abundance of opportunities to teach almost anywhere in the nation.



DON'T Just Emphasize that Teaching is a “Good Thing to Do”

Teacher candidates already know that teaching is a noble profession. Even those who are not interested in teaching generally believe that a teacher’s job is really important. This perception is not a defining characteristic unique to those considering a career in teaching.

Section 3

Potential

Users

Everyone has a role to play in encouraging the next generation of teachers. Specifically, college and university faculty, and high school teachers play an important role in making students aware of this rewarding career opportunity.

The following are a few ways that educators can reach out to students in their own contexts.

College and University Faculty

- **Talk about career options** each year – including teaching – to both introductory major and non-major classes.
- Include information about teaching in your **recruitment efforts** by using the Student MythBusters (see pg. 40).
- Offer Learning/Teaching Assistant opportunities and foster a peer-tutoring program in your department to **give students exposure to teaching**.
- **Build a relationship** with your teaching methods course instructors.

High School Teachers

- **Talk about career options** each year – including teaching – to all of your students.
- Encourage your school’s guidance counselors to **motivate all students** to take your courses.
- Provide opportunities throughout the course to **allow students the experience of teaching** – through student presentations and shared co-teaching, to formalized peer tutoring.

- **Speak with enthusiasm about your own teaching** of math or science, and the personal and professional benefits you have as an educator.
- **Model effective teaching practices.**
- Know details about how your students can pursue a teaching certificate through **local programs**.
- Place a *Get the Facts Out* poster in your classroom, office, hallway, or other public space.
- Offer students a *Get the Facts Out* brochure as you invite them to consider a career in teaching.
- Celebrate a “Day of Teaching” to bring awareness to the career.

There are many supports to help you shift perceptions about secondary math and science teaching with your students and your colleagues.

There are many resources to help you change the culture in your department or community as people think about secondary math and science teaching.

Talk about teaching with students.

Section 4: Sample Content in this booklet will provide you with templates to talk about teaching and change the perception of students about what it means to be a secondary math or science teacher, including a modifiable poster, a one-page flyer, brochure, and a set of Student MythBusters questions to prompt discussion that can be easily embedded into a lecture.

Measure your students' perceptions of teaching.

Section 4: Sample Content in this booklet will provide you with the Perceptions of Teaching as a Profession (PTaP) and analysis tool to quantify how your students feel about teaching.

Talk about teaching with your colleagues.

Section 4: Sample Content in this booklet will provide you with tools to talk about teaching and change the perception of your colleagues about what it means to be a secondary math or science teacher, including Faculty MythBuster and workshop resources to prompt discussions with faculty.

Model good teaching practices.

Being aware of research on good teaching – and using effective practices – helps everyone to see that teaching is a respected profession with a special skill set. Work to improve your own craft by reaching out teaching professional societies in *Additional Resources*.

Know about the pathways to become a teacher.

Helping students decide to be a teacher means providing them guidance on what to do next. Learn more about this in *Section 5: Next Steps*.

Section 4

Toolkit

The following section illustrates how to use the communication principals for your own context. In each piece, we have identified where we:

1. Connect around shared values and lived experience
2. Acknowledge concerns and address potential misperceptions
3. Establish context and credibility
4. Avoid common pitfalls

Please do “plagiarize” any of the templates in this section and modify them to fit your own context with your own branding and information that is unique to you. Please use the tools to support your work.



TESTIMONIAL – A few words with big impact

Audience/Setting: Students in introductory math and science courses.

Time: 2 minutes / prep: 5 minutes

Synopsis: A teaching testimonial is a brief personal statement about why teaching matters to you as part of your introduction on the first day of class.



One of the most powerful connections for students seeking a direction for a career is insight into what their professors, who are role models, are passionate about.

Sharing a personal testimonial about why teaching is important to you can open the door to your students to consider a career in teaching.

Implementation: Introduce yourself to your class. Many faculty like to give some personal and professional background, including their research focus and a synopsis of their life story. In doing so, provide a testimonial about your value of good teaching:

*Experience from the University of Arkansas and West Virginia University shows that the most important factor in your personal testimony is **expressing an authentic reason why teaching is important. Display your passion.***

Below is a template that might help you craft your own message:

<p>“How I teach you in my class is very important to me. A good math/science education can help you be more successful in college and in your future career.”</p>
<p>“I am a researcher <i>and</i> a teacher. Both of these parts of my job are important to me, because I know how important good math/science teaching is to you and your learning.”</p>
<p>“Teaching is one of the best and most important parts of my day. It is one of the reasons I decided to become a member of the faculty here at [your institution].”</p>

Good to Know:

- Do not assume that your value of teaching is implied. No matter how much work you put into your teaching, students are not always going to see it or understand the importance it holds for you if you do not explicitly tell them.

- It is not necessary to have a personal connection to high school teaching; what is necessary is that you share why teaching your students is important to you.
- This is likely just the first step in a process in which you describe middle and high school teachers among many examples of STEM professionals.

BROCHURE - Thinking About Teaching?

Audience/Setting: Students in introductory math and science courses / Personal conversation with students

Time: 10-15 minutes

Synopsis: Use this brochure to engage students in deeper conversation about considering a career in secondary math or science teaching.

Implementation: Download and this brochure from <https://bit.ly/2IDfiKm>. (A modifiable version will become available in fall 2018). Engage students one-on-one with the brochure as a discussion piece. If you feel comfortable, as students discuss their perceptions of teaching, share the information in the brochure with them.

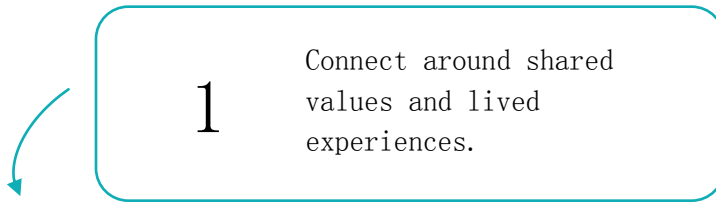


This brochure can be used as a conversation-starter or as a take-away for a student to ponder after a discussion. Pin up multiple brochures in the classroom or hallway near a “Blow Minds! Teach Science/Math” poster, or leave some out in the department office or waiting area.

Use this template to create your own personalized brochure, and for distribution at your institution.

Modify this cover to place branding for your own discipline and teaching programs.

Draw attention to the relevant features of the brochure while using effective communication strategies.



IT PAYS TO TEACH

It might seem most sensible to start discussion around the inherent goodness of teaching. While it is important to empathize with students who are interested in teaching because they want to help others, don't overlook other elements of a prospective teacher's value system.

Financial incentives are of great importance to most STEM majors. Remind students that it does pay to teach, and that it's worth looking at the full benefits package of a teacher, not just the simple salary.

When considering base salary, salary scale, benefits (including insurance, retirement, and tuition reimbursement), and college loan forgiveness, a teachers' financial status can look equivalent or even surpass that of non-teaching STEM careers.

LOOKING FOR A CHALLENGE?

Students interested in math and science often value the intellectual challenge of their disciplines. Despite the perception that teaching math or science to secondary students is easy, teachers actually interact more frequently and more deeply with their content area than many other professionals in math or science.

Teaching - worth it in more ways than you may think.



It pays to teach.

Most people underestimate teacher salaries by \$10,000 - \$30,000.

There are student loan forgiveness programs and scholarships for teachers.

Most teaching jobs have better retirement benefits than private industry.



Looking for a challenge?

Teachers report similar or greater levels of intellectual challenge in their jobs compared to other STEM professionals.

2

Acknowledge concerns and address potential misperceptions.

BE HAPPY. TEACH PHYSICS.

STEM majors, who often purposely chose an intellectually-rigorous major, are often concerned that secondary teaching won't be intellectually fulfilling. This fear often comes from the cultural perception expressed by the old adage "Those who can, do. Those who can't, teach." It's not uncommon for a math or science major who expresses interest in teaching to be told that they are "too smart" to consider secondary teaching.

Data from STEM teaching and non-teaching professionals shows a different story, however. Science teachers report having equal or higher job satisfaction and intellectual challenge in their jobs than other STEM professionals.

WANT TO BE IN DEMAND? TEACH PHYSICS.

STEM majors want to be competitive in the marketplace, and teaching math or science gives them that edge. STEM majors who value making a difference in the world while being on solid financial grounding shouldn't overlook teaching as one possible career option.

Refer students to the American Physical Society's PoPA report and resources about financial aid for teacher candidates (listed in the brochure) for additional data and statistics on secondary math and science teaching



Be happy. Teach physics.

Teachers report equal or higher job satisfaction than other STEM professionals.

Over 78% of science teachers are still in the classroom after 5 years of teaching.



Want to be in demand? Teach physics.

Science teachers are in incredibly high demand.

Physics teachers can find a job almost anywhere in the US and even internationally.

About half of all physics majors report an interest in becoming a teacher.

MAKE AN IMPACT.

Students often want to have a real, tangible impact on the world. The relationship-building inherent to teaching does just that.

3 Establish context and credibility.

4 Avoid common pitfalls.

Remember that the purpose of this brochure is not to contradict nay-sayers, but to remove perceived obstacles for those students who might be considering a career in secondary math or science teaching.

Good to Know:

- Don't hold back on just sharing the brochure with students who you think are potential to become teaching candidates. It isn't always possible to identify who has interest, and don't assume that teaching is an innate skill for which some students are better suited over others. Use this brochure with the intent to change perceptions, not just to recruit.
- It is ok if you do not immediately know all the answers to the questions asked by students about teaching. Let them know that you can direct them to the right contact person who can help them, including a colleague and/or a local math or science teacher. (If you still don't know who to contact, reach out to one of the organizations listed in the "About *Get the Facts Out*" section).
- Consider pinning some brochures for students to take up next to a "Thinking About Teaching" poster (see previous module).



Make an impact.

Teachers are 6x more likely to feel they make a difference than other STEM professionals.

Teachers get opportunities to have schoolwide, districtwide, and statewide impact.



Blow minds! Teach physics.

Learn more at

your URL
and
teach.org

FLYER - Blow Minds. Teach Math or Science.



Audience/Setting: Students in introductory math or science courses, table-top flyer for hallways, offices, open houses, recruitment events, or career fairs.

Time: 30-60 minutes to modify and print

Synopsis: Modify this flyer to reflect information about your institution's programs and opportunities to try teaching, including your schools' colors. Distribute at recruitment events and places visible to students.

Implementation: Download this flyer from <https://bit.ly/2r4AwG1>. (A modifiable version will become available in fall 2018). Use the template to include information about your local teacher education program. This flyer can be used as a take-away for students to learn about additional details unique to your institutional context. Include information such as:

- Special programs dedicated to teaching (i.e., UTeach, Noyce, STEM institutes)
- Coursework
- Scholarships
- Contact information for faculty points of contact

Don't forget to include imagery of real people with whom interested candidates can connect, including current math or science education majors.

Good to Know:

- Don't think just about formal educational coursework or career pathways. Enhancing the perception of the value of teaching extends to informal opportunities to try teaching, such as tutoring, joining a student club to do math or science outreach, or volunteering at a museum.

Blow Minds. Teach Science or Math.

TEAM-UP TEACHER EDUCATION ALLIANCE
MINES - UNC PARTNERSHIP

TEAM-UP's Mission
is to offer a path towards secondary teacher licensure in math or science for Mines students by providing University of Northern Colorado (UNC) Professional Teacher Education (PTEP) coursework, as part of a Mines degree, online or at the Mines campus to Mines undergraduate students.

Coursework
TEAM-UP students can begin taking classes at any time during their career at Mines. The program includes 30 credit hours*, including 9 hours of student teaching (completed after graduating from Mines). All Professional Teacher Education courses are online or face-to-face on the Mines campus.
*6 hours may count as HASS mid-level electives and other courses will count towards free electives.

Funding / Scholarship Opportunities

- Noyce Internships: The Noyce Internship program provides Mines students the opportunity to explore secondary (7-12 grade) teaching through a paid internship. Interns receive **\$11.25/hr for up to 80 hours of work.**
- Noyce Scholars: The TEAM-UP Noyce Scholarship Program supports Mines students pursuing a secondary (7-12 grade) teaching license in science or mathematics. Scholars receive **\$10,000/semester** during their junior year, senior year, or after graduating. Scholarships are competitive and the recipient is required to complete two years of teaching in a high needs school district for each year of scholarship received.

For more information visit:
<https://krefrycenter.mines.edu/team-up-home.html> or contact
Kristine Callan (kcallan@mines.edu)
Wendy Adams (wadams@mines.edu)
Lacy Cleveland (lcleveland@mines.edu)
Stephanie Fanselow (Stephanie.Fanselow@unco.edu)

Pathways into Education
Make it a hobby or a profession!

- ✓ Informal Outreach
- ✓ College teaching
- ✓ Middle School or High School Teaching
- ✓ Classroom volunteer
- ✓ Educational Policy
- ✓ Museums

Teacher Education Alliance is a student club committed to discussing educational issues. Join on OrgSync!

Education courses count towards your HASS mid-level electives or free electives.

Academic year Internship opportunities

- o Noyce Internship

Summer Internship opportunities

- o Generation Teach Internship
- o SUMMET/SAFE Teaching Internships

Teaching: Worth it in more ways than you may think.

Did you know...

- There are student loan forgiveness programs and scholarships for math and science teachers?
- Most teaching jobs have better retirement benefits than private industry?
- You can get a job almost anywhere as a science or math teacher?
- Most people who estimate teacher salaries by \$50,000-\$60,000?
- Science teachers report having higher overall job satisfaction than other STEM professionals?
- Teachers have the option to make \$6-\$8K each year for coaching, clubs, after school tutoring, etc.?
- Teaching is one of the best ways to work towards teaching science or math in an inner city school?
- Math and science teachers are in high demand?
- Teachers are six times more likely to say that they make a difference in people's lives than other STEM professionals?
- Over 75% of high school science teachers are still in the classroom after 5 years of teaching?
- About half of all science and math majors report an interest in becoming a teacher?

SURVEY – Perceptions of Teaching as a Profession (PTaP) survey & Analysis Tool



Audience/Setting: Any STEM students

Time: 8 minutes

Synopsis: Give this survey to assess the student perceptions about grade 7-12 math and science teaching as a profession.

Implementation: Visit <https://www.surveymonkey.com/r/PTaPv2PhysTEC> to see the survey in Survey Monkey, from which you may “Make a Copy,” or use the survey found in the [Appendix](#) of this document to enter into your own survey software, or administer hard-copy. More detail about the development and validation can be found in [Section 5 – About Get The Facts Out](#)

The following are *sample* items from the PTaP.

Choose one of the above five choices that best expresses your feelings about the statement. If you don’t understand a statement, leave it blank. If you have no strong opinion, choose Neutral.

1. I know at least one professor in my department who thinks Grade 7-12 teaching is a valuable profession.
2. I know who to talk to at my college if I want to become a Grade 7-12 teacher.
3. My department would be proud if I became a Grade 7-12 teacher.
4. Professors in my department discuss teaching as a career option with students.
5. Professors in my department encourage students to consider Grade 7-12 teaching.
6. If I told my advisor I wanted to be a Grade 7-12 teacher, s/he would encourage me.
7. If I became a Grade 7-12 teacher, I would not be making the most of my degree.
8. If I were to become a Grade 7-12 teacher, I would give up being a scientist.

Through our development work and statistical analysis, we determined 11 empirical categories of students’ perceptions of teaching as a profession:

1. Personal Enjoyment
2. As a Career Choice
3. Support by Others
4. Department Values and Encourages Teaching
5. Department Supports Me Teaching
6. Employee Benefits and Security
7. Teaching is Scientific
8. Nurturer
9. Back Up Plan

10. All Students Can Learn

11. I Would If ...

There is an Excel spreadsheet available that can be used to score your data in these 11 categories, as well as quickly provide you the number of students who indicate that they are pursuing certification at your institution or through another route.

This data has a range of uses including identifying the number of students who would pursue teaching given correct information about the profession. The PTaP can also be used longitudinally or pre/post to monitor your efforts to get the facts out about the profession. If you are willing to share the data from your institution, contact Wendy Adams at wkadams@mines.edu.

Good to Know:

- This resource was developed with data from STEM undergraduates and graduates at a range of U. S. universities.
- This assessment is can be administered online or in class. We administer it online and found students take just under 8 minutes on average to complete. The results can be analyzed with the PTaP Excel Analysis Tool to determine the appropriate course of action for addressing myths with students and your colleagues.

WORKSHOP – Faculty MythBusters



Audience/Setting: Math and science teaching faculty, admissions, career services, advising staff / Department meetings, meetings, conferences

Time: 50 - 90 minutes

Synopsis: This resource includes highly interactive workshop materials (PowerPoint slides and handouts) designed to facilitate discussion with a group of **faculty/staff** who may talk with students about teaching as a career.

Implementation: Use these workshop materials in the context of a faculty meeting, staff meeting, or with teachers to get the facts out about middle and high school teaching and to encourage department members, teachers, recruiters, and advisers to speak positively and accurately about the teaching profession with students. These materials are designed for a 50-minute interactive workshop with college faculty/staff or a 90-minute interactive workshop with practicing teachers. The workshop is designed to encourage participants to dig into the content presented in Section 1 of this booklet. Our research has found that more time is needed with teachers than faculty and staff and in turn, more time is needed with faculty and staff than with students. Teachers are aware of many of the facts related to the profession but have strong misperceptions about other STEM careers.

Additional points and background information can be found within the downloadable PowerPoint slides in the notes section of each slide.

The materials were constructed with the intent to help **faculty/staff** to:

1. Provide realistic information about salaries with data for teachers, college faculty, and other STEM professionals.
2. Generally explain other financial benefits including retirement options, scholarships, and loan forgiveness for teachers compared to private sector STEM jobs.
3. Provide information about teacher job satisfaction including accurate teacher retention data.

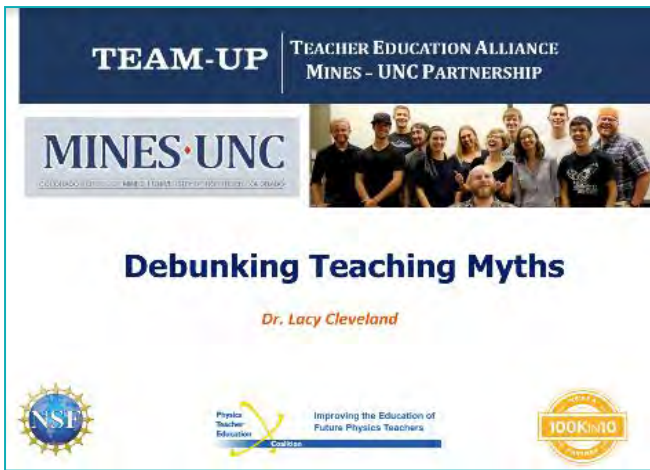
Additionally, the materials were constructed with the intent to help **presenters** to:

1. Learn more about participants' perspectives on the teaching profession, which can then inform efforts to create effective recruiting efforts in their local context.

The materials include the following:

- PowerPoint Presentation: <https://bit.ly/2LnTHmC>
- Sample Handout “Salary Increase by Major”: <https://bit.ly/2GEU4Wt>
- Sample Handout “Secondary versus College Teaching”: <https://bit.ly/2keKAZh>
- Sample Handout “Retirement and Loans”: <https://bit.ly/2rZZNBV>
- Sample Handout “Job Satisfaction and Outcomes”: <https://bit.ly/2KMWzZw>

Given the locale specific nature of the teaching profession, materials reference both national data and local data, when necessary, from the Denver, Colorado area. Instructions are included within the power point slides (in the notes section) on how to modify the PowerPoint and handouts with local data if desired. When presenting at national conferences, we have used these materials with the Colorado data and then encouraged participants to go online and mine data from their local districts and state as a comparison. As reference there are 41 states with higher teacher salaries than Colorado.



Begin with slides that include “clicker questions” to elicit common myths about teaching.

Prepare participants to bust their own myths with data.

Modify the suggested handouts to reflect local district and college salaries.

Teacher Benefits Information
Updated 9/5/2016

Colorado Retirement
Colorado schools offer PERA Retirement Benefits:
 • Your eligibility for retirement is based on years teaching + age.
 • For example, if you begin teaching when you are 22 years old, you are eligible to retire with full benefits when you are 57. The PERA calculator shows that a person who does this will earn ~87.5% of their highest salary as their pension.
 To explore pension amounts based on age and years of experience, try out this calculator:
<https://www.colorado.gov/perspectives/calculator/pera-teacher-strengthening-future>

Federal Student Loan Forgiveness for Teachers
<https://studentaid.ed.gov/sa/100/how-to-use/repayment/cancellation/teacher>

Direct Subsidized and Unsubsidized Loans
 • Up to \$17,500 if you are a highly-qualified math or science teacher in a secondary school after teaching.
 • Can only apply after completion of the 5 years.

Cancellation of up to 300% of Perkins Loans
 • 15% (years 1 and 2) (includes interest accrued during the year)
 • 20% (years 3 and 4)
 • 30% (year 5)
 • Qualify for deferment of Perkins Loans while teaching full time math or science.
 (Perkins loans = not forgiveness)

THE WALL STREET JOURNAL

Salary Increase by Major

Major	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22	2022-23
Accounting	\$44,682.00	\$47,308.00	\$49,934.00	\$52,560.00	\$55,186.00	\$57,812.00	\$60,438.00
Business	\$44,682.00	\$47,308.00	\$49,934.00	\$52,560.00	\$55,186.00	\$57,812.00	\$60,438.00
Education	\$44,682.00	\$47,308.00	\$49,934.00	\$52,560.00	\$55,186.00	\$57,812.00	\$60,438.00
Engineering	\$44,682.00	\$47,308.00	\$49,934.00	\$52,560.00	\$55,186.00	\$57,812.00	\$60,438.00
Healthcare	\$44,682.00	\$47,308.00	\$49,934.00	\$52,560.00	\$55,186.00	\$57,812.00	\$60,438.00
Humanities	\$44,682.00	\$47,308.00	\$49,934.00	\$52,560.00	\$55,186.00	\$57,812.00	\$60,438.00
Law	\$44,682.00	\$47,308.00	\$49,934.00	\$52,560.00	\$55,186.00	\$57,812.00	\$60,438.00
Life Sciences	\$44,682.00	\$47,308.00	\$49,934.00	\$52,560.00	\$55,186.00	\$57,812.00	\$60,438.00
Mathematics	\$44,682.00	\$47,308.00	\$49,934.00	\$52,560.00	\$55,186.00	\$57,812.00	\$60,438.00
Natural Sciences	\$44,682.00	\$47,308.00	\$49,934.00	\$52,560.00	\$55,186.00	\$57,812.00	\$60,438.00
Physical Sciences	\$44,682.00	\$47,308.00	\$49,934.00	\$52,560.00	\$55,186.00	\$57,812.00	\$60,438.00
Public Administration	\$44,682.00	\$47,308.00	\$49,934.00	\$52,560.00	\$55,186.00	\$57,812.00	\$60,438.00
Public Health	\$44,682.00	\$47,308.00	\$49,934.00	\$52,560.00	\$55,186.00	\$57,812.00	\$60,438.00
Public Policy	\$44,682.00	\$47,308.00	\$49,934.00	\$52,560.00	\$55,186.00	\$57,812.00	\$60,438.00
Religion	\$44,682.00	\$47,308.00	\$49,934.00	\$52,560.00	\$55,186.00	\$57,812.00	\$60,438.00
Social Sciences	\$44,682.00	\$47,308.00	\$49,934.00	\$52,560.00	\$55,186.00	\$57,812.00	\$60,438.00
Teaching	\$44,682.00	\$47,308.00	\$49,934.00	\$52,560.00	\$55,186.00	\$57,812.00	\$60,438.00
Visual Arts	\$44,682.00	\$47,308.00	\$49,934.00	\$52,560.00	\$55,186.00	\$57,812.00	\$60,438.00
Writing	\$44,682.00	\$47,308.00	\$49,934.00	\$52,560.00	\$55,186.00	\$57,812.00	\$60,438.00

Secondary Teacher vs. College Teaching

Teacher Salaries
Updated 10/25/2017

District	BA yr 5	BA yr 5	MA yr 5	MA yr 15
Douglas County Schools https://www.douglascountyschools.org/employment/salaries/compensation	\$43,100	\$43,207	\$13,725	\$49,570 - 74,000
Jefferson County Schools https://www.jeffersoncountyschools.org/employment/salaries/compensation	\$38,760	\$44,083	\$49,839	\$46,000 - \$74,100
Routter Valley Schools https://www.routtervalleyschools.org/employment/salaries/compensation	\$44,812	\$48,002	\$61,907	\$48,340 - \$91,674
Denver Public Schools https://www.denverpublicschools.org/employment/salaries/compensation	\$41,680*	\$42,080*	\$48,203*	\$46,954 - \$11,077* (\$7.18)

Get the Facts Out

Good to Know:

- These materials are ideal to use with both faculty and other folks students may go to for advice including guidance counselors, advisors, administrators, and members of the wider community (including members of STEM industry professions and even parents).
- As public employees, public school teachers' employment and salary data is typically readily available online, and easily searchable. Encourage participants to look up local district or state salaries on their laptops or mobile devices at an appropriate time during the presentation.
- During discussions the workshop facilitator should circulate and encourage participants to discuss actual data and strongly discourage the sharing of anecdotes as if they are data. Encourage them to fact check any information they bring to the discussion with evidence they can find online (media articles are not evidence).

WORKSHOP – Student MythBusters

Audience/Setting: Undergraduate or graduate STEM discipline students



Time: 15-30 minutes

Synopsis: This resource includes workshop materials (PowerPoint slides and handouts) designed to facilitate discussion with groups of **students** who may or may not be interested in teaching themselves, in a variety of contexts.

Implementation: Use these workshop materials in the context of a drop-in interactive presentation in a major or non-major course, a student club meeting, a professional development seminar, or a recruitment event. Similar to the Faculty MythBusters, this interactive presentation elicits and confronts potential misperceptions about salary, retirement, and job satisfaction for teachers in comparison with private sector positions for the same majors. Short (15 minute) and long (30 minute) versions are available, and both presentations cover the content presented in Section 1 of this booklet.

Workshop materials include slides with questions to be used via “Peer Instruction” and informational handouts that can be shared with others (peers, parents, etc.). We have found it effective to follow these slides with information about our local teacher education program now that students have a more realistic and positive view of the profession.

Additional points and background information can be found within the downloadable PowerPoint slides in the notes section of each slide.

The materials were constructed with the intent to help **students** to:

1. Provide realistic information about salaries with data for teachers, college faculty, and other STEM professionals.
2. Generally explain other financial benefits including retirement options, scholarships, and loan forgiveness for teachers compared to private sector STEM jobs.
3. Provide information about teacher job satisfaction including accurate teacher retention data.

Additionally, the materials were constructed with the intent to help **presenters** to:

1. Learn more about students’ perspectives on the teaching profession, which can then inform their efforts to create effective recruiting efforts in their local context.

The materials include the following:

- **Short** PowerPoint Presentation: <https://bit.ly/2HWCK44>
- **Long** PowerPoint Presentation: <https://bit.ly/2r4ipPK>
- Sample Handout “Salary Increase by Major”: <https://bit.ly/2GEU4Wt>
- Sample Handout “Secondary versus College Teaching”: <https://bit.ly/2keKAZh>
- Sample Handout “Retirement and Loans”: <https://bit.ly/2rZZNBV>
- Sample Handout “Job Satisfaction and Outcomes”: <https://bit.ly/2KMWzZw>

Given the locale specific nature of the teaching profession, materials reference both national data and local data, when necessary, from the Denver, Colorado area. Instructions are included within the power point slides (in the notes section) on how to modify the PowerPoint and handouts with local data.

Good to Know:

- We recommend giving this presentation to all students not just those who you think are interested in teaching. It is essential that we shift perceptions of the teaching profession not only to recruit future teachers, but to encourage those who are not considering teaching to respect the career and support their peers who choose to pursue it.
- If you have limited time with a group of students, we have found that it is more important to engage them with MythBusters than to give an overview of our teacher preparation program. This is because it doesn’t matter how generous the scholarship offers are or how streamlined the licensure program is if students don’t believe they can have a high-quality career as a teacher.
- As public employees, public school teachers’ employment and salary data is typically readily available online, and easily searchable. Encourage participants to look up local district or state salaries on their laptops or mobile devices at an appropriate time during the presentation.

RESOURCES FOR NEXT STEPS



Audience/Setting: One-on-one conversations with students

Times: 30-60 minutes

Synopsis: Supporting students who are interested in teaching math or science by having a brief personal conversation using the ideas outlined in this guide.

1. Use the **First Conversations Guide** to have a brief personal conversation with students who have expressed interest in teaching.
2. Then, recommend a variety of practical resources for taking the next steps in exploring a career in teaching:
 - a. **Go to TEACH.org** and sign up online to receive ongoing, discipline-specific support to foster their interest in teaching, and to learn more about resources for math and science teacher candidates. While on Teach.org, encourage students to take advantage of its many opportunities, including the following:
 - Create a personalized roadmap to a career in teaching
 - Attend an event to learn more about the teaching profession
 - Set up a phone call with an experienced math or science teacher
 - Find a teacher prep program (if the students' university does not offer one)
 - Find scholarships to earn a teaching degree
 - b. **Talk to any resident Teachers in Residence** (if your site has a U-Teach or PhysTEC program).
 - c. **Observe a high school math or science class**, talk to a local teacher (including any of the student's prior teachers they admire), and learn about what their day-to-day work is like and to observe a class without a commitment.
 - d. **Take an Early Field Experience course** to try out teaching in a middle or high school classroom.
 - e. **Apply for internship experiences like Breakthrough Collaborative.** These experiences help students build confidence in formal teaching through opportunities such as "mini student teaching," and help students to build positive connections to teachers and the profession.
 - f. **Take an introductory education course** on your campus.



- g. **Engage in trial formal teaching** experiences, such as serving as a teaching assistant, a learning assistant, or providing peer tutorial support.
- h. **Engage in trial informal teaching** experiences, such as doing math or science education outreach with the department's student group, volunteering at a museum, or helping with a fair or festival.

Implementation: When students express interest in teaching, do your best to put the student in touch *with an appropriate contact person you trust* to help the student learn how to start the teaching pathway. If you are the appropriate contact person, engage students in a formal advising session to build a sustaining professional relationship that can support students in their quest to become a teacher. Use the guide below to help frame your conversation:

First Conversations Guide

Students who have an interest in teaching often reach out to someone they trust to ask questions about the profession. These first conversations typically take between 30 and 60 minutes, are extremely important, and can be surprisingly similar from one person to the next. Here are some ideas to consider for your next conversation with a prospective teacher candidate.

Questions to ask

- Tell me a bit about your interest in teaching? What's drawing you to it? The idea is to get them to still share even if they aren't sure they want to teach.
- What do you think would be your favorite class to teach? This will help you know what type of licensure they may want to pursue, along with giving you a better indication of their current interest level in teaching.
- How did you hear about our teacher preparation program? This may help you keep track of which recruiting practices are most effective.
- What questions and concerns do you have about becoming a teacher? It is good to give students space to express their concerns so that you can hopefully alleviate them with fact-based information.

First Conversations Guide (continued)

Things to share

- Handouts from the Student MythBusters presentations.
- Your own teaching experience and what you find rewarding and intellectually stimulating about it. Many students are pleasantly surprised to hear that teaching doesn't become boring after a year or two!
- Differences between teaching in higher ed (tenure-track vs. non-tenure-track), high school, and middle school. For example, teaching loads, research expectations, pay, benefits, and other logistical considerations (e.g., picking where you live), are important factors that many students do not know much about.
- Information about early teaching opportunities, student club activities, scholarship opportunities, and the teacher preparation pathways at your institution.

Common student questions and concerns

- Does teaching get boring after a year or two? This question can be answered both with your own experience and by pointing to job satisfaction data in the Student MythBusters handouts.
- Some STEM students believe they should go into industry first, even though they plan to eventually become a teacher. Some reasons students have given for doing this are to build up a nest egg, appease parents, or build credibility as a science or math teacher (many students have pointed to a teacher who was an engineer who they really admired). It is important to hear where they are coming from so that you can address it. For example, in many cases students would actually be better off in terms of retirement by going into teaching straight away.
- Classroom management is a concern for many students. It is helpful to point out that they will begin to develop classroom management skills as part of your teacher preparation program and that experienced teachers do not see this as an issue.

Next steps → Recommend the general resources in the Synopsis of this section, and make sure students are linked into site-specific resources:

- Are they on your email list?
- How do they sign up for classes?
- How do they get involved with the student club?
- Are there student ambassadors they can talk to about their experiences?
- Is there information they can take with them to share with their family?

Good to Know:

- If you need to hand the student off to another point of contact about teacher education programs, communicate directly with the point of contact yourself, share the student's contact information (if the student has given permission to do so), and ensure that the student and the point of contact are successful at getting in touch.
- Ensure that the point of contact is well informed about getting a degree to prepare the student to become a teacher in their disciplinary area. Avoid handing off students to general College of Education contacts who might not understand the specific disciplinary interests or needs of the student.
- Even if you don't know about teacher education programs at your university, continue to be a supporting presence to the student as he or she continues to consider and pursue a career in teaching.

Section 5

About *Get the Facts Out*

Development & Testing

All of the resources in this booklet have been heavily tested in departments that prepare future math and science teachers, reviewed by a panel of teacher education experts (including practicing secondary math and science teachers), used with math and science undergraduate students, graduate students, and faculty. All of the messaging, tools, and templates are based on data gathered by Dr. Wendy Adams from student interviews and large-scale surveys conducted as part of the development and validation of the PTaP instrument (found on page 39).

This research identified that common misperceptions about the profession were preventing many students from considering teaching as a profession. Many of these were around factual data that could be easily shared with students and the people they are likely to go to for advice about careers (e.g., faculty, parents, peers).

Development and validation of the PTaP instrument followed best practices in the development of formative assessments of instruction (citation). This work included extensive student interviews, expert interviews, large-scale data collection, and statistical analyses including a factor analysis. This work identified the most prominent, empirically determined themes in students' responses about their perceptions of secondary math and science teaching.

Data collected from twelve institutions are shown in Tables 1a. and 1b. Here you can see that when comparing students who want to become a teacher with those who do not, there are significant differences between

Table 1a. PTaP v2			
I want to become a grade 7-12 teacher.	Neutral	No	Yes
N = 777	156	481	140
Overall (53)		39.4	66.8
Personal Enjoyment		12.2	87
As a Career Choice		37.1	75.8
Support by Others		48.1	69
Department Values & Encourages Teaching		35.5	59.7
Department Supports Me Teaching		47.2	64.1
Employee Benefits and Security		29.4	48.4
Teaching Is Scientific		50.1	80.7
Nurturer		33	86.9
Back Up Plan		42.1	49.2
All Students Can Learn		59.3	80

Table 1b. PTaP v2			
I want to become a grade 7-12 teacher.	Neutral	No	Yes
N = 777	156	481	140
Pursue Teaching Cert at my Institution		5	85
Pursue Teaching Cert other route I would if...		18	16
		179	45

these two populations for each category.

To identify those who want to teach, we combined those who chose either agree or strongly agree on the statement *I want to become a grade 7-12 teacher*. For those who do not want to teach, we combined students who chose disagree or strongly disagree with this statement. If a student chose neutral, we did not include them in this analysis.

All scores in Table 1a. are % agreement with what the experts identified as positive and accurate perceptions of the profession.

A few specific statements of interest are listed in Table 1b. with raw numbers of students who indicated agreement with these statements. The final set of statements listed "I would if..." comprises a group of four statements such as "I would become a grade 7-12 teacher if the pay were equal to my other career options."

Additional insights on how to change perceptions on secondary math and science teachers were gained by working with the Teacher Advisory Group (TAG) at the Colorado School of Mines. The TAG, which is composed of science and math teachers in addition to industry professionals and state department of education personnel, were provided data on the profession. This data included information on the state's retirement system, survey data on job satisfaction of physics majors, and national retention data. The TAG tackled the data, and, in the end, everyone left with a higher opinion about the benefits of the teaching profession. In turn, teachers were surprised at the realities of industry. This conversation served as the basis of the MythBusters workshop.

MythBusters workshops have been used with multiple audiences over two years, both locally in Colorado and at national conferences. Feedback is continually collected, and modifications are made to continue to refine the content. A year after the first TAG meeting described above, the latest version of the workshop was taken back to the TAG for their feedback on what it had become. They had suggestions to enrich it further and provided fact-checking. The current version can be found in the Toolkit with instructions on how to customize the data for your local region.

Faculty at Colorado School of Mines have given variations of this presentation to a variety of student groups over a two-year span. These groups have included: students taking a required course for their major, student clubs, students employed by residence life, and students who have expressed explicit interest in becoming teachers. The results are generally positive, with the most notable outcome being 12 out of 30 students signing up to meet with a teacher preparation advisor after one such presentation in a required class for Engineering Physics majors.

Following success with the MythBusters initiative, Dr. Adams acquired support from 100Kin10 to organize a Project Team, composed of all members, institutions, and societies listed at the front of this book, with the goal of working together to combat myths surrounding teaching.

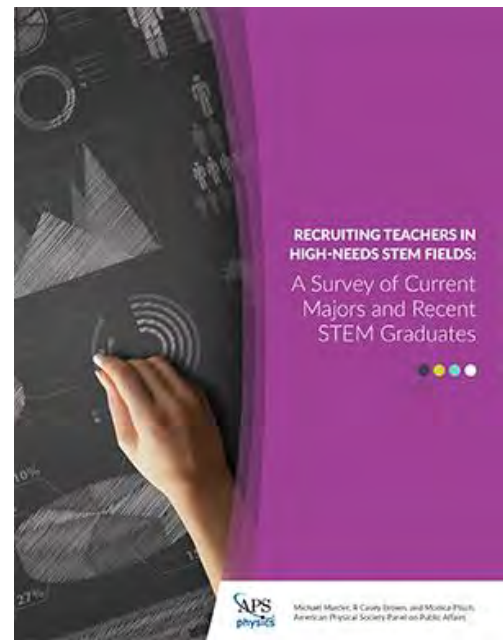
The team identified a set of positive messages about the profession to combat the misperceptions that were identified by both the PTaP research and the American Physical Society's Panel on Public Affairs report titled *Recruiting Teachers in High-Needs STEM Fields: A Survey of Current Majors and Recent STEM Graduates*. These messages were tested through student interviews and a survey of undergraduate and graduate students majoring in STEM disciplines. Only those messages that were perceived as positive by students were retained. These messages comprise the content of the various additional tools and templates, and the booklet you are reading today.

To learn more

American Physical Society's Recruiting Teachers in High-Needs STEM Fields: A Survey of Current Majors and Recent STEM Graduates

A recent report from the American Physical Society draws attention to the deeply held, but often misinformed, beliefs about teaching among STEM faculty and students.

Get the full report here:
<https://goo.gl/NbLYJx>



The Importance of Talking about High School Teaching, Monica Plisch

A New Survey Uncovers Strong Misperceptions About the Teaching Profession. What Can We Do to Get the Facts Out?, Wendy K. Adams

MythBusters: Interventions to Address and Correct Misperceptions About the Teaching Profession, Kristine Callan, Wendy K. Adams, and Lacy Cleveland

Additional Resources

We hope that this resource can be helpful to you as you work to change the perceptions of middle and high school science and math teaching as a profession by getting the facts out to students, faculty, and community members.

Get access to additional resources about middle and high school math and science teaching at the following institutions and professional societies involved in creating this booklet:

TEACHING INITIATIVES

TEACH.org

<https://www.teach.org/>

TEACH.org is a nonprofit organization, led by Microsoft and the U.S. Department of Education to explore the profession of teaching. Those interested in teaching can attend an event to learn more about teaching, talk to an experienced teacher, and learn about various certification and qualification requirements.



Breakthrough Collaborative

<https://www.breakthroughcollaborative.org/>

Breakthrough partners with middle-and high school students from under-resourced communities to realize their incredible potential and put them on the path to college. Breakthrough is also the largest pre-service teacher training program in the country, providing a best-in-class experience for more than 1,000 undergraduate teaching fellows every year.



Physics Teacher Education Coalition

<https://www.phystec.org/>

The Physics Teacher Education Coalition (PhysTEC) is a partnership between the AAPT and APS, and has a mission to improve and promote the education of future physics teachers. PhysTEC supported sites develop their physics teacher preparation programs into national models by implementing a set of key components that project leaders have identified as critical to success in physics teacher preparation.



PROFESSIONAL TEACHING SOCIETIES

American Association of Physics Teachers
<https://www.aapt.org/>



The AAPT is a professional physics science society dedicated to the pursuit of excellence in physical science education, composed primarily of physics teachers at the secondary and higher education levels.

American Physical Society
<https://www.aps.org/>



The APS is a non-profit membership organization working to advance and diffuse the knowledge of physics through its outstanding research journals, scientific meetings, and education, outreach, advocacy, and international activities.

American Chemical Society
<https://www.acs.org/>
<https://teachchemistry.org/>



The ACS is the world's largest scientific society, and has the vision to improve people's lives through the transforming power of chemistry. ACS supports a division focused on K-12 education, and sponsors the K-12 professional teaching society, the American Association of Chemistry Teachers (AACT).

Mathematical Association of America
<https://www.maa.org/>



The MAA is the world's largest community of mathematicians, students, and enthusiasts whose mission is to advance the understanding of mathematics and its impact on the world. MAA supports learning in the mathematical sciences by encouraging effective curriculum, teaching, and assessment at all levels.

MODEL ACADEMIC INSTITUTIONS

West Virginia University
Center for Excellence in STEM Education
<https://stemcenter.wvu.edu/>



The WVU Center for Excellence in STEM Education works to increase the number of students and professionals in STEM, in part, by enhancing the quality and supply of STEM teachers.

Colorado School of Mines, Dept. of Physics
<https://physics.mines.edu/>



The Colorado School of Mines Department of Physics is a member of PhysTEC, and produces physics majors with teaching credentials as part of a 4-year degree program.

PARTNERSHIP SUPPORTERS

100Kin10
<https://100Kin10.org>

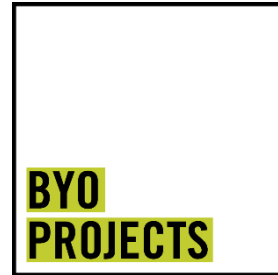


This project team's collaborations have been financially supported by 100Kin10 and shepherded through the focused attention of **Lauren Baier**, **Isis Krause**, and **Nathaniel Schacht**. 100Kin10 unites 200+ of the nation's top academic institutions, nonprofits, foundations, companies, and government agencies to train and retain 100,000 excellent STEM teachers by 2021. 100Kin10 offers partners the vision and resources to amplify their work, accelerate their collective efforts, and educate the next generation of innovators and problem solvers. For more information, go to <http://www.100Kin10.org> or e-mail info@100Kin10.org.

About BYO Projects

<https://www.facebook.com/BYO-projects-119486414776797/>

This toolkit is modeled after “Plagiarize this: A user-friendly guide to talking about college- and career-ready standards with just about anyone,” crafted by BYO founder **Yasmin Fodil**. BYO is a collective of strategists, designers, technologists, and copywriters who come together to create services, experiences, and materials that solve public problems. This work results in the creation of engagement strategies, training sessions, workshops, informational materials, toolkits, and more. Learn more at byoprojects.com.



Appendix

Appendix: Perceptions of Teaching as Profession

Items 1-18 are a number of statements that may or may not describe your beliefs about teaching. You are asked to rate each statement by selecting one of the following options (unless directed otherwise):

- a. Strongly Disagree
- b. Disagree
- c. Neutral
- d. Agree
- e. Strongly Agree

Choose one of the above five choices that best expresses your feelings about the statement. If you don't understand a statement, leave it blank. If you have no strong opinion, choose Neutral.

1. I know at least one professor in my department who thinks Grade 7-12 teaching is a valuable profession.
Strongly Disagree 1 2 3 4 5 Strongly Agree
2. I know who to talk to at my college if I want to become a Grade 7-12 teacher.
Strongly Disagree 1 2 3 4 5 Strongly Agree
3. My department would be proud if I became a Grade 7-12 teacher.
Strongly Disagree 1 2 3 4 5 Strongly Agree
4. Professors in my department discuss teaching as a career option with students.
Strongly Disagree 1 2 3 4 5 Strongly Agree
5. Professors in my department encourage students to consider Grade 7-12 teaching.
Strongly Disagree 1 2 3 4 5 Strongly Agree
6. If I told my advisor I wanted to be a Grade 7-12 teacher, s/he would encourage me.
Strongly Disagree 1 2 3 4 5 Strongly Agree
7. If I became a Grade 7-12 teacher, I would not be making the most of my degree.
Strongly Disagree 1 2 3 4 5 Strongly Agree
8. If I were to become a Grade 7-12 teacher, I would give up being a scientist.
Strongly Disagree 1 2 3 4 5 Strongly Agree
9. Teaching is "scientific" in that you test materials with your students, learn from the results, modify and try again the next year.
Strongly Disagree 1 2 3 4 5 Strongly Agree
10. I owe it to myself to try a career in my degree field before I try to teach.
Strongly Disagree 1 2 3 4 5 Strongly Agree
11. I would like a career where I help people.
Strongly Disagree 1 2 3 4 5 Strongly Agree

12. Grade 7-12 teaching is a good back up plan for me.
Strongly Disagree 1 2 3 4 5 Strongly Agree
13. Those who go into Grade 7-12 teaching tend to be academically weaker students.
Strongly Disagree 1 2 3 4 5 Strongly Agree
14. Grade 7-12 teaching is a good career choice in general.
Strongly Disagree 1 2 3 4 5 Strongly Agree
15. Grade 7-12 teaching is a good career choice for me.
Strongly Disagree 1 2 3 4 5 Strongly Agree
16. I think Grade 7-12 teaching would be fulfilling in general.
Strongly Disagree 1 2 3 4 5 Strongly Agree
17. I think Grade 7-12 teaching would be fulfilling for me.
Strongly Disagree 1 2 3 4 5 Strongly Agree
18. I would be proud to tell people that I am a Grad 7-12 teacher.
Strongly Disagree 1 2 3 4 5 Strongly Agree
19. What fraction of Grade 7-12 teachers remain in the profession after 5 years?
- 28%
 - 41%
 - 59%
 - 79%
 - 90%
20. As a Grade 7-12 teacher, I would be paid as well as other careers using my degree.
Strongly Disagree 1 2 3 4 5 Strongly Agree
21. How much do you think a Grade 7-12 science teacher's pay is in your state?
- <\$30,000
 - ~\$40,000
 - ~\$50,000
 - ~\$60,000
 - >\$70,000
22. What do you think your starting pay would be if you graduate with a **bachelor's** in your current major?
- <\$30,000
 - ~\$40,000
 - ~\$50,000
 - ~\$60,000
 - >\$70,000

23. I know what types of benefits (retirement, time off, health insurance) Grade 7-12 teachers receive.
Strongly Disagree 1 2 3 4 5 Strongly Agree
24. Grade 7-12 teachers have competitive benefits compared to other careers.
Strongly Disagree 1 2 3 4 5 Strongly Agree
25. Grade 7-12 teachers can retire comfortably and not have to work after retirement.
Strongly Disagree 1 2 3 4 5 Strongly Agree
26. Grade 7-12 teachers can retire comfortably before age 60.
Strongly Disagree 1 2 3 4 5 Strongly Agree
27. Grade 7-12 teaching would be intellectually stimulating.
Strongly Disagree 1 2 3 4 5 Strongly Agree
28. I think I would enjoy Grade 7-12 teaching day to day.
Strongly Disagree 1 2 3 4 5 Strongly Agree
29. I think I would become bored with Grade 7-12 teaching.
Strongly Disagree 1 2 3 4 5 Strongly Agree
30. If I went into Grade 7-12 teaching, my peers would be supporting.
Strongly Disagree Disagree Neutral Agree Strongly Agree Does not matter
31. If I went into Grade 7-12 teaching, my family would be supportive.
Strongly Disagree Disagree Neutral Agree Strongly Agree Does not matter
32. If I went into Grade 7-12 teaching, my professors would be supportive.
Strongly Disagree Disagree Neutral Agree Strongly Agree Does not matter
33. I want to become a grade 7-12 teacher.
Strongly Disagree 1 2 3 4 5 Strongly Agree
- For what reasons? _____
34. I want to become a college teacher. Strongly Disagree 1 2 3 4 5
Strongly Agree
- For what reasons? _____
35. Getting a teaching license is a difficult process that takes too much time.
Strongly Disagree 1 2 3 4 5 Strongly Agree
36. I plan to pursue teacher certification at my institution.
Strongly Disagree 1 2 3 4 5 Strongly Agree
37. I plan to pursue teacher certification through another route.
Strongly Disagree 1 2 3 4 5 Strongly Agree

If so, where? _____

If you agreed/strongly agreed with #36 or #37, skip to #43.

38. I would become a Grade 7-12 teacher if the pay were equal to my other career options.
Strongly Disagree 1 2 3 4 5 Strongly Agree
39. I would become a Grade 7-12 teacher if the hours were better.
Strongly Disagree 1 2 3 4 5 Strongly Agree
40. I would pursue teacher certification if I did not have to take extra time to graduate.
Strongly Disagree 1 2 3 4 5 Strongly Agree
41. If would pursue teacher certification if I did not have to spend extra money.
Strongly Disagree 1 2 3 4 5 Strongly Agree
42. I knew that I could never be a Grade 7-12 teacher.
Strongly Disagree 1 2 3 4 5 Strongly Agree
43. Some people enjoy organizing things, or gardening for the sake of doing the activity. Repetitive lab tasks are this way for me. Lab tasks could be mineral separation, microscopy, building robotics, etc...
Strongly Disagree 1 2 3 4 5 Strongly Agree
44. I enjoy working with people.
Strongly Disagree 1 2 3 4 5 Strongly Agree
45. I enjoy working with teens.
Strongly Disagree 1 2 3 4 5 Strongly Agree
46. For the most part, other people are friendly.
Strongly Disagree 1 2 3 4 5 Strongly Agree
47. We use this statement to identify people who are not reading the statements before answering. Please choose "agree" (option 4), not "strongly agree" to preserve your answers.
Strongly Disagree 1 2 3 4 5 Strongly Agree
48. I could become a great Grade 7-12 teacher.
Strongly Disagree 1 2 3 4 5 Strongly Agree
49. I might become a Grade 7-12 teacher after pursuing another career first.
Strongly Disagree 1 2 3 4 5 Strongly Agree
50. Grade 7-12 teaching is a stable career choice.
Strongly Disagree 1 2 3 4 5 Strongly Agree
51. As a Grade 7-12 teacher, I could find a job almost anywhere.
Strongly Disagree 1 2 3 4 5 Strongly Agree

52. Grade 7-12 teaching is more stressful on average than other careers.
 Strongly Disagree 1 2 3 4 5 Strongly Agree
53. Nearly everyone is capable of understanding math and science if they work at it.
 Strongly Disagree 1 2 3 4 5 Strongly Agree
54. Many students just don't have the natural ability to succeed in my subject area.
 Strongly Disagree 1 2 3 4 5 Strongly Agree
55. Almost all students can learn a subject with dedication.
 Strongly Disagree 1 2 3 4 5 Strongly Agree
56. You cannot be a good teacher unless you can entertain.
 Strongly Disagree 1 2 3 4 5 Strongly Agree
57. Very strong students should not waste their skills on teaching, even if they have the motivation to enjoy the profession.
 Strongly Disagree 1 2 3 4 5 Strongly Agree
58. I was inspired by a great Grade 7-12 science or math teacher.
 Strongly Disagree 1 2 3 4 5 Strongly Agree

Demographics

59. I am currently in my _____ year in college:

- a. 1
- b. 2
- c. 3
- d. 4
- e. 5
- f. 6
- g. >6

60. I am currently pursuing my

- a. Undergrad
- b. Master's degree
- c. Doctorate degree

61. I am:

- a. Male
- b. Female
- c. Prefer not to answer
- d. Other: _____

62. I identify as:

- a. Hispanic or Latino
- b. Not Hispanic or Latino

63. I identify as:

- a. Black or African American
- b. Asian or Pacific Islander
- c. American Indian or Alaska Native
- d. White

64. I am majoring in: _____

65. The name of my institution is: _____