

2020 | Year 2

Get The Facts Out Annual Report



Authors

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About Get the Facts Out

Get the Facts Out (GFO) is a five-year, NSF-funded partnership of the Colorado School of Mines and four national societies: the American Physical Society, the American Chemical Society, the American Association of Physics Teachers, and the Association of Mathematics Teacher Educators. GFO is a unique project designed to reach STEM majors in a large fraction of all U.S. mathematics, chemistry, and physics departments and has the potential to address teacher shortages in these high-need STEM disciplines significantly.

Repairing the Reputation of the Teaching Profession

To change the conversation around STEM teacher recruitment at institutions across the country, GFO produces research-based content and reports that faculty can use to help improve their teacher recruitment efforts. The resources are designed to celebrate the positives of teaching and to provide students and faculty with facts that address misinformation and common misperceptions about teaching. The GFO Project Team continually works to update and improve these resources as well as provide support to the faculty who use them.

These resources, and all other content in this report, are intended to be used broadly to change the conversation around STEM teaching careers. We encourage anyone to use and distribute these materials for their intended purpose, within the terms of the <u>Creative Commons license described here</u>.



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Accomplishments

* What are the major goals of the project?

Get the Facts Out (GFO) is a national information campaign that promises to increase the number of well-prepared math and science teachers nationwide. In turn, this will increase the number and the diversity of HS graduates who have both the interest and the preparation to persist as STEM majors. GFO is a cost-effective approach to recruiting that can be implemented by any IHE. It targets widespread negative perceptions that can be barriers to recruiting and promotes positive, accurate messaging about the teaching profession. This unique project is designed to reach STEM majors in a large fraction of all U.S. math, chemistry and physics departments and has potential to significantly address teacher shortages in these high-need STEM disciplines. For example, if every U.S. physics department recruited just one more teacher each year, the severe national shortage of qualified physics teachers would be largely addressed. (D. E. Meltzer, M. Plisch, and S. Vokos, Editors, *Transforming the Preparation of Physics Teachers: A Call to Action*. A Report by the Task Force on Teacher Education in Physics (T-TEP) (American Physical Society, College Park, MD, 2012).

To develop and implement a national campaign we formed a project team that includes leadership from professional societies in the mathematical and physical sciences, experts in behavioral change and leaders in teacher education, and several IHEs were chosen to serve as study sites. During the project, the societies will leverage their connections with disciplinary departments to implement this national campaign, which will be sustained by the societies after project funding ends. The study sites will implement local GFO campaigns and assist researchers in gathering quantitative and qualitative data to document impact and inform toolkit revisions.

The goals of the Get the Facts Out project are to:

- 1. change perceptions of the teaching profession among faculty, teachers, students, and parents
- 2. increase the frequency of faculty engaging in practices in the Get the Facts Out toolkit, and
- 3. increase numbers of math, chemistry, and physics majors who enroll in a certification program.

Further, we seek to document the campaign's effectiveness.

The strategic plan fo	r vear 2-4	as written in	our proposal	is as follows:
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Activity	Years 2-4
Toolkit development	Toolkit revised based on user feedback, research and evaluation
	Messaging sent to target audiences
Society campaigns	Workshops and webinars offered
	User groups facilitate
	Survey & enrollment data gathered from both types of sites
Research	Site visits completed
	F-PTaP survey development paper published
	Data on champions and change agents gathered
Evaluation	 Evaluative feedback on motivation and preparation given
	Evaluative les on research done
	Project Management Team meetings
Project management	Project Area Teams meetings
	Annual Project meeting

In response to our External Evaluator's recommendations, we built our first annual strategic plan Spring 2020. This strategic plan is much more detailed than the proposal strategic plan and better reflects our project intentions for the year. Moving forward we will create the strategic plan on an academic year basis, September – August. This will create better, but not perfect, alignment with our funding cycle. Below you will find the Spring and Summer columns from our 2020 strategic plan.

2020 Strategic Plan

Working Group	Spring (Jan - Apr)	Summer (May - Aug)
PI Team	 Approve and onboard new math partner(s) Write NSF Annual Report Approve Communications Strategy and Branding Strategy Seek additional funding Check in on WG progress on this plan 	 Approve AY20-21 Strategic Plan Approve NAB/Annual Meeting agendas Hold virtual NAB Meeting Check in on WG progress on this plan

	· Identify new math nartner(s)	· Draft AY20-21 Strategic Plan
Planning and	· Schedule NAB/Annual Meetings	· Draft NAB/Annual Meeting agendas
Management	· Plan NSE Annual Report	• Edit and submit NSE Annual Report
	Draft Communications Stratogy	Draft Communications Stratomy
Communications	Draft Communications Strategy	Draft Branding Strategy
	 Develop and pilot marketing plans 	Assess and revise marketing plans
	• Establish online fora to support users	Assess and revise online fora
Societies	Publish Spring Newsletter	Publish Summer Newsletter
	 Provide recognition to Qualitative Sites and organize 1-2 virtual 	Develop plan to engage Quantitative Sites
	meetings	Engage Qualitative Sites to develop plans
		for AY20-21
	Host ~1 workshop per Change Agent	
Change Agents by	Implement local efforts and provide written feedback to Toolkit WG	• Create plans for AY20-21 workshops and
Discipline	Attend All Change Agent Meeting	local efforts
	Create 1-2 blog articles for the website	
	 Finalize student and faculty v2. brochures 	· Undate resources based on AY feedback
Toolkit	 Continue to collect salary data by location 	• Create 2-3 blog articles for the website
Development	 Hold All Change Agent meeting 	· Develop 6 two-minute videos
	Create 2-4 blog articles for the website	
	• Publish V 2.0 by 1/17/20	 Implement remaining 2.0 version changes
Website Design	 User-testing of V 2.0 	 Continue to build out Facts and Data
	 Post 5-10 blog articles from various WGs 	 Post 3 blog articles from various WGs
	Present at Winter AAPT	Becoarch schedule development
	 Research schedule development 	Site visit reports
	 Present at PhysTEC and APS March Mtg 	Write PEPC paper(s)
	· Qualitative Site visits	Present at Summer AAPT/PERC and RCCE
Research Team	 Quantitative reports of all yr 1 data collection 	· Ouantitative reports of Sn yr 2 data
Research reall	 Quantitative Site: Spring data collection 	collection
	 Publish Richard's PTaP.HE paper 	· Publish PTaP naner
	· Draft PTaP paper	· Create 3-5 blog articles for the website
	 Create 4-6 blog articles for the website 	· PFR PD
	· PER PD	
	 Finalize change agent tracking form 	
Evaluation	Finalize workshop survey	
	 Pilot test chatbots as communication strategy 	 Possible interviews with change agents
	Develop Fidelity of Implementation rubric for self- and external	 Interpret Faculty Strategy Implementation
	evaluation and apply to test cases	(FSI) data
	 Start working on plan of evaluation of local champion activities 	
	 Brief survey (FSI) of change agents 	

To close the loop, below are the plans from our Year 1 annual report

Toolkit

• Continue development of the resources based on user-feedback, results of data mining, research, and evaluation.

Society Campaigns

- Change Agents will expand the number of faculty champions by facilitating national workshops and supporting participants throughout the year as they develop their own local campaigns.
- Messaging will be sent to target audiences via existing society networks.
- Webinars will be offered for faculty champions who cannot travel to a national conference.

Research

- Analyze the baseline data collected from the quantitative sites and provide reports to each institution.
- Conduct the second round of site visits.
- Collect the second year of survey and enrollment data from the quantitative sites.
- Complete the statistical analyses of the F-PTaP version 2.0.
- Ongoing copy write development and testing.
- User-testing of the GettheFactsOut.org website.
- User-testing of any modified or new GFO resources.
- F-PTaP survey development paper published.

Evaluation

- Continue to provide support through a developmental evaluation approach.
- Collect data on champions and change agents.
- Provided an evaluative lens on the research done.

Project Management

- The overall project management and the PMT will meet regularly to provide guidance to the project.
- Other PATs/Working groups will meet as needed to facilitate their objectives
- Convene the first virtual meeting of the National Advisory Board (NAB)
- Convene the annual in person project meeting with champions from the qualitative sites, members of the PMT, the NAB, and if funding secured, disciplinary Change Agents.

* What was accomplished under these goals (you must provide information for at least one of the 4 categories below)? Major Activities:

This list is organized to align with the outline of plans from Yr1 annual report. Data is for 7/1/19 - 6/30/20 (the External Evaluator's report was completed in May)

- **Toolkit Development** The *Get the Facts Out* Toolkit is a set of tested resources and strategies for recruiting STEM teachers. It contains both faculty/staff and student presentations, posters/brochures/flyers, a listing of potential venues for engaging students, surveys, and other resources. This work is being led by PI Adams in collaboration with Isola the Project Coordinator for AAPT and several other personnel on the project depending on the resource. Yr2 activities include:
 - Website: GettheFactsOut.org. PI Adams, AAPT's Isola & APS web team undertook a massive revamping of the website. Faculty and prospective student interviews were conducted to determine a logical organization for the two key target audiences. It now has a prospective teacher facing section called *Explore Teaching*, which includes tested messaging about the profession backed by data. Additionally, we include links to every state's dept. of ed. page that lists all approved teacher preparation programs. We could not find another site that does this so created our own. The website continues to deliver the toolkit resources and includes a GFO Community map with PIs, Change Agents, GFO Champions (users of our resources), study sites and the research team. Web sessions are up Yr1: 1,659 vs. Yr2: 7,588. Yr2 resource downloads: 613
 - Blog: The idea of a blog emerged from the Annual Meeting as a way to share emergent results. Several blog articles are written and waiting for the launch of the blog on the website.
 - Posters and Brochures: Title, photos, and messaging updated based on messaging research. Editable versions were created in PowerPoint based on user feedback about the accessibility of the software of previous versions. Downloads: Posters – 125, Brochures - 149
 - Presentation: *Teaching: The best kept secret!* Version 3.0 modified for virtual use by making it more of a presentation with interactive questions rather than a group data mining exercise. The need for skilled facilitator guidance of groups is also substantially reduced. Delivered 17 times by GFO Team, Downloads: 121
 - Workshop: How to build a local GFO campaign (local and national versions). Updated based on improvements to Teaching: The best kept secret! Delivered 10 times by GFO Team (not yet online)
 - Presentation: *Busting myths about the teaching profession,* Version 3.0 created with updated data and framed around our highest rated *Did you knows* rather than the myths. Delivered 10 times by GFO Team, Downloads: 140.
 - Handout: There are four handouts for the faculty presentation/workshop and two handouts for the student presentation. All of these were updated with attention to data visualization and user-tested for accurate and positive interpretation.
- Society Campaigns As planned, Change Agents (CA) engaged in national campaigns delivering workshops and webinars to national audiences and supported new GFO Champions (users of our resources). The external evaluator's report shows the reach of these efforts and offers suggestions on how we can improve in this critical area. APS and ACS coordinated the CAs efforts; additionally, PI Adams began holding All CA Meetings each term so that resource updates could be shared directly with CAs and to facilitate interdisciplinary collaboration. The national societies utilized their individual networks to message members as described in Question 4 below.
- **Research** Adams leads the research team efforts which continue to be substantial and are integrated into every aspect of the project from longitudinal data collection efforts to messaging and resource development and user-testing.
 - PTaP & PTaP.HE (pronounced P-Taffy) (formerly FPTaP) Perceptions of Teaching as a Profession and PTaP for Higher Education. The PTaP.HE factor analysis was completed, categories were named, and organization and data visualization of results was determined. Due to the sensitive nature of faculty perceptions we have elicited an unusual amount of faculty feedback and involvement in this aspect of the development. PTaP scoring and data viz were also updated to create consistency between the instruments. We hope to write the development and validation papers this coming year.
 - Site visits 3 site visits completed which included faculty and student focus groups, one or more *How to build a GFO Local Campaign* workshops, meeting with Deans and other administrators, and meeting with faculty champions. Customized materials were created for each site. Remaining site visits rescheduled virtually Fall 2020.
 - Quantitative sites Virtual recruitment and data collection strategy meetings were offered to increase use of GFO materials 19 IHEs engaged. Yr1 data has been analyzed for ~60 IHEs and reports sent. 1/3 of the anticipated data is collected for Yr2. Efforts

began mid-March and only 2 IHEs collected data this Spring due to COVID-19 shutdowns. Faculty are adjusting and data collection efforts have resumed.

- Messaging Continuing to develop emotionally engaging messages and identify images for both students and faculty. Tested via 4 student and 4 faculty focus groups held at 3 IHEs (Colorado School of Mines, California State University Long Beach, and Brigham Young University)
- Teacher Salary Data Mining Project It has become clear that the energy barrier of looking up local teacher salaries to customize the resources is too great. We also have struggled to find accurate national teacher salaries. For these reasons we embarked on our own data mining project by collecting data from two districts near each of our 60 participating sites. Any faculty can also fill out our new teacher salary data request form and we will send them their local data. Request: 9
- Publications The first GFO peer-reviewed research paper was published Fall 2019 and four more have been submitted and are in review this summer.
- **Evaluation** The external evaluator is taking a developmental evaluation approach to support the emerging innovation in a dynamic and complex environment where multiple pathways forward exist. This work has influenced and supported the project throughout year 1.
 - Reports:
 - 2019 National Advisory Board Virtual Meeting Feedback
 - 2019 Annual Meeting Evaluation
 - 2020 Annual Evaluation Report (see supplementary material)
 - Instruments:
 - Finalize change agent activity tracking form
 - Finalize workshop survey and automated analysis and visualization tools for change agents
 - Develop Fidelity of Implementation rubric for self- and external evaluation and apply to test cases
 - Update Faculty Strategy Implementation (FSI) questionnaire to align with Fidelity of Implementation
 - Modify the FSI for Change Agent use and collect data from change agents
 - Other methods:
 - Pilot test chatbots as communication strategy
 - Develop the strategy for providing facilitation support to GFO champions which also provides feedback to evaluation, including checklists to use for workshop preparation, and registration forms.
 - Conduct evaluation audit in December 2019 to close the feedback loop on evaluation feedback to date.
- Project Management Overall management led by PI Adams collaborating closely with co-PI Plisch. Oversight supplied by the Project Management Team (PMT). Due to the scope of the project and recommendation from the External Evaluator we have created working groups which tackle various aspects of the project - listed in our strategic planning matrix above. The National Advisory Board (NAB) met in August for a virtual half day meeting and then two weeks later in person in Colorado for the Annual meeting with PIs and representatives from each qualitative site. This was a packed full day resulting in substantive feedback from the sites and NAB. The biggest recommendations were around website updates and adding a student facing section.

Specific Objectives:

Get the Facts Out has three overarching goals. We are beginning to collect data demonstrating success with the first goal "(1) change perceptions about the teaching profession by faculty, teachers, students, and parents". Goals (2) and (3) require survey data for at least two years to demonstrate an increase in the number of faculty using GFO resources and increases in enrollment. Therefor we will share some data demonstrating (1) above and also share some recent work we've engaged in to expand on our intentions for broadening participation in STEM.

In partnership with our external evaluator, we have built a pre/post-test coupled with some evaluative questions that is embedded in the faculty-facing slide deck. Participants answer the Survey Monkey questions via any device and responses are analyzed by the external evaluator. This instrument serves several purposes:

- Provides feedback to the evaluator on the faculty-facing workshops for any presenter including project personnel, change agents, or GFO Champions
- Provides the Research Team with feedback on the effectiveness of the presentation's learning objectives
- Engages participants with the material contained in the presentation before and after they dive into the data; testing is an effective technique to improve recall.
- Provides presenters with feedback on their presentation and a personal connection to GFO

Here we present results from four different faculty-facing presentations: two face-to-face and two virtual workshops/presentations of varying length. Full reports for the following four presentations have been uploaded as one supplementary file. This survey rolled out in late February so was only used twice face-to-face before everything went virtual. We quickly updated the presentation for use in a virtual format and have since delivered it twice. The new virtual version is nimbler in its design so that it can more easily be adjusted for various length

presentations. In all cases, we have seen strong learning gains and effect sizes (For a pre to post comparison we consider an effect size >1.5 to be large).

- 1. Western Regional Noyce Conference. Kristine Callan (GFO Champion), face-to-face, 60 minutes GFO.
 - 1. Normalized gain: 69%, Effect size: 2.25
 - 2. Workshop ratings on four criteria: 1.5 to 0.7 (possible range per question: -2 to 2)
- 2. Brigham Young University Site Visit, Wendy Adams (PI) & Jared Breakall (Post-doc), face-to-face, 45 minutes GFO.
 - 1. Normalized gain: 84%, Effect size: 3.46
 - 2. Workshop ratings on four criteria: 1.2 to 0.9 (possible range per question: -2 to 2)
- 3. West Virginia University Academic Advising Council, Wendy Adams (PI), Jared Breakall (Post-doc) & Savannah Logan (Post-doc), virtual, 60 minutes GFO/90 minutes total.
 - 1. Normalized gain: 73%, Effect size: 2.87
 - 2. Workshop ratings on four criteria: 2.0 to 1.5 (possible range per question: -2 to 2)
- 4. Colorado School of Mines Foundation Lunch Bunch, Wendy Adams (PI), Taylor Plantt (High School teacher), Eric Norfleet (future high school teacher), virtual, 15 minutes GFO/50 minutes total.
 - 1. Normalized gain: 38%, Effect size: 1.47
 - 2. Workshop ratings on four criteria: 1.5 to -0.1 (possible range per question: -2 to 2)

These results also provide evidence of validity for the pre/post and the workshop evaluation questions since the shorter version of the presentation did result in decent learning gains (38%), but only about half of what is seen in the longer format (69%-84%). Additionally, the workshop fidelity of implementation questions show that there wasn't enough time in the 15-minute presentation to meet what we've identified as best practices for these presentations.

Broadening participation in STEM

In response to recent events in the U.S., the Get the Facts Out Team spent time articulating the project's existing objectives and actions which are aimed towards diversifying the STEM teacher workforce.

- GFO works to open the door to the profession for all people who have an interest in teaching. Increasing the number of people going into the profession will increase the candidate pool, which will allow districts more opportunity to identify new teachers who align well with their student populations.
- GFO has made a consistent, conscious effort to include diverse participants in the project, develop resources that meet the needs of a range of people, and to collect data from a diverse set of institutions.
 - GFO messaging/copy write research efforts have been designed to collect feedback from a diverse student population across the U.S. We have also consciously chosen a range of people to include in our photo assets. These photo assets have been and continue to be tested with a range of students to identify appropriate assets for each population.
 - When identifying our partner institutions that would serve as GFO Qualitative Sites, we attended to diversity in their selection so that site visits could collect perspectives from a range of students.
 - We are currently looking for a replacement Physics Change Agent and are specifically looking to fill the role with a person from an MSI (Minority Serving Institution), preferably an HBCU (Historically Black College or University).

Additionally, we asked the question, "could we be more proactive?". The answer is, yes; and so we have developed the following additional objectives:

- We will compile data about our Quantitative Sites so that we can identify how these could become more diverse. We will then:
 - work to recruit additional Quantitative sites to create a representative pool of sites;
 - work to recruit more MSI and HBCU type institutions;
 - leverage existing networks such as the APS and ACS Committees on Diversity's community of HBCUs;
 - Create a blog article about diversity, access, and inclusion efforts within the GFO project outlined so far and also include facts, such as the following, about the current teacher population compared to the U.S. labor force:

Race	Teachers*	U.S. Labor Force **
White (non-Hispanic	79%	67%
Black (non-Hispanic)	7%	12%
Hispanic	9%	17%
Asian	2%	6%

American Indian/Alaska Native	1%	1%
Two or more races	2%	2%

*NCES 2015-206 school year **U.S. Labor Force 2016 BLS.gov

• Offer GFO project assistance to HBCUTeach a new partnership between the National Math and Science Initiative, United Negro College Fund, and UTeach that recently began a project to build STEM teacher preparation programs at fifteen HBCUs in six states.

Significant Results:

There are two supplemental files included with this report to provide visuals for the first (PTaP.HE and PTaP Data Visualization) and third (Pictogram of Prospective Students) findings below.

Faculty perceive they are more supportive than their perceptions may suggest

We have spent significant time this year working on data visualization for both the PTaP.HE and PTaP results. Efficient and accurate interpretation of these results is critical for the quantitative sites to understand their GFO reports and to begin thinking about how they can improve their sites' support of future teachers. Attached please find a document that contains both a one-page outline describing the PTaP.HE data visualization and a one-page outline describing the PTaP.HE data visualization scheme we've settled on.

While working to organize and understand the story being told by the PTaP.HE data, we found that the ten categories which emerge from the factor analysis seemed to fall under two major groupings 1. *Faculty perceptions of teachers and their careers and 2. Faculty perceptions of advising and student career options.* Interestingly we found that individual category scores within the grouping "Faculty perceptions of teachers and their careers" ranged from 50% - 24% while the individual category scores within the grouping "Faculty perceptions of advising and student career options" ranged from 61.8% - 78.1%. These results indicate that the majority of faculty believe they are supportive of students choosing teaching as a career path (64%); however, the majority of faculty do not believe teaching is a good career (24%) nor do they respect the profession (44%).

Our student results demonstrate that students perceive actual faculty support of the career, and it is reflected in their career intentions. A site by site analysis of our Yr1 data consistently demonstrates this. This work provides evidence that faculty members must be properly informed about STEM teaching careers in order to help abate the nationwide teacher shortage. In addition, to prevent communication of subtle and subconscious cues that discourage students from pursuing the profession, faculty members must develop a genuine respect for the profession.

Our data shows no difference in perceptions of teaching as a profession by faculty type

As we engaged in the work to measure faculty perceptions of teaching as a profession, we were asked many times if there are differences between different types of faculty. Each person had a thoughtful reason for why there might be a difference in support of students pursuing a teaching career based on position type or gender, for example. When analyzing our first year of data, we looked into these questions. Surprisingly, no differences of any practical significance were found between faculty from different departments, between faculty by position type, or between faculty by gender in how they perceive grade 7-12 teaching as a career. This was unexpected because as faculty demographics differ, one may suspect that their experiences would also differ in ways that would influence their perceptions of grade 7-12 teaching. The fact that faculty members from various backgrounds generally have similar perceptions of grade 7-12 teaching provides evidence, in addition to previously conducted faculty interviews, that we can approach our efforts to change perceptions of grade 7-12 teaching in a more uniform way than one may suspect. This work is described in one of our 2020 PERC paper submissions, *Maybe we aren't that different after all: Faculty perceptions of grade 7-12 teaching as a career*.

Analysis of student interest – Pictogram of Prospective Teachers.

The research team, in an effort led by our newest postdoc Jared Breakall, created a method for analyzing the seven statements on the PTaP that indicate either student intention or interest towards becoming a grade 7-12 teacher. He created a visual we call the Pictogram of Prospective Teachers, see attached supplemental material for an example using our national data set. This analysis of 1960 students across the U.S. indicates that 54% of students surveyed have some level of interest in teaching. This result is consistent with the surprising results from a 2017 report* that found 40-50% of STEM majors have interest in teaching.

*Marder et. al. <u>American Physical Society's Recruiting Teachers in High-Needs STEM Fields: A Survey of Current Majors and Recent STEM</u> <u>Graduates</u>.

The Lead

"Teachers in the United States rate their lives better than all occupation groups, trailing only physicians."

This year we learned that it's important to have a single main message and then all other messages will make sense in that context. At one point in our work, we had framed our student materials around three myths of the teaching profession, and we found that our results that year were pretty flat. We reported this in last year's report; we learned you do not first state the misperceptions when teaching something

new. In hindsight this seems intuitive. Now, we not only share only accurate information, but we also frame it all within the context of our lead. Why do teachers rate their lives so highly? We solicit reasons from the audience and then share data on salary, teacher's schedules, retirement benefits, respect etc. In this way, it's much easier to redirect any negative anecdotes that an audience member would like to share. We are focusing on the 80+% of teachers that rate their lives highly, why could that be?

Key outcomes or Other achievements:

External Evaluator Summary

GFO is an ambitious project, aiming to address a complex, systemic problem (the lack of qualified K-12 STEM teachers) through tested marketing campaign which addresses most levels of the educational system.

The most substantive successes in Yr2:

- 1. The research and Toolkit materials are a shining strength of the project. The Toolkit has been extensively developed based on user needs and research. The materials exemplify features of projects which are effectively disseminated, and uses effective persuasion techniques. The Toolkit and other resources have been an intensive focus, which is appropriate given their central importance.
- 2. The design of the project around "Change Agents" is resulting in national reach. A total of 59 outreach activities were reported by change agents, reaching approximately 1000 faculty, staff, and students; this represents a substantial increase over the 500 reached in Year 1 of the project. About one-third of the attendees reached are faculty, representing approximately 130 institutions. Physics, in particular, is on track to reach half of all physics departments during the 5-year project. Thus, the model of several change agents undertaking a few activities does result in broad reach.
- **3.** The engagement of several leading disciplinary societies leverages the resources and reach of these organizations. The human resources, communication mechanisms, and coordination available to GFO would not be feasible without the society partners, who have contributed data mining assistance, website, design, project management, and targeted dissemination mechanisms within the discipline. The website has had over 10,000 unique pageviews since September (5000 for the home page), and a total of 430 material downloads. The email and Facebook page have over 200 members. (through 5/30/20)
- **4. Get the Facts Out is well-positioned to achieve the desired scale due to stakeholder engagement**. In the language of scaling science, scaling is more likely when partnerships and relationships are leveraged; "inclusive coordination." The engagement of change agents, disciplinary societies, and use of user-centered design all represent inclusive coordination. For the disciplinary societies this coordination is mostly top-down "directed coordination" an agreed upon strategy and coordinated implementation of the project. For the emerging national network of change agents and champions, however, the coordination is more "undirected coordination"; emergent, organic and self-organizing.
- **5.** The project has engaged in significant continuous improvement of its approach. The project has responded to feedback from the evaluation and other sources to create strategic planning, working groups, develop the website, develop a fidelity of implementation framework, conduct all-change-agent meetings, support local data mining, and create Toolkit materials which support the emerging needs.

The primary challenges of the project at this point are:

- 1. Many conditions need to be met for the national reach to result in the desired change. The project impact will not be met simply by reaching large numbers. Some additional conditions must be met:
 - 1. *The workshops and local campaigns are persuasive,* using the critical features of GFO (i.e. fidelity of implementation). It is unclear the degree to which this is happening or that the critical features are guiding interventions.
 - 2. *The number of national, faculty-facing workshops are increased,* and reach a variety of institutions, to ensure the message is spread broadly to faculty. This is particularly important for Chemistry and Math.
 - 3. The national campaigns are persuasive and inspire champion engagement, allowing for repeated exposure to the messages of GFO and urging potential champions to take local action. The website has had visibility, for example, but traffic is not increasing as one would expect. The coordination of communication strategies for change agents and champions has proven difficult. It is unclear to what degree the national campaigns are achieving fidelity of implementation to critical features of the project. I am concerned whether national campaigns and change agent intervention is engaging champions adequately.
- 2. The optimal scale required to achieve change requires some strategic thought. How will adequate numbers of faculty be reached, and how will the right type of faculty be reached to actually result in broad spread of GFO messages? Is "number of faculty/students" reached the best measurement of project impact? What additional types of project impacts are most highly valued, and for which stakeholders? Would engaging fewer people potentially result in greater impacts due to the increased effectiveness of a few highly-engaged and trained change agents and/or champions? Or do the benefits of broad engagement outweigh the costs of time, resources, and diminished connection to those doing the work?

3. Time is a continued challenge, for all involved. Overall, it seems that the project is requiring more time from those engaged than originally anticipated. Change agents are busy and difficult to schedule, yet more engagement is required for them to learn about the project and be effective in their role. PI Adams must juggle and attend to multiple project strands – including a very time-consuming research design. The society leaders are high-stature and thus engaged in a great many national projects. The challenge of time has made it difficult to achieve a common understanding of what successful outcomes and strategies are for the project, as well as a streamlined communication strategy – but the time constraints also highlight the need for such streamlining.

Questions to consider

- 1. TIME: How might we make time spent on the project most effective and manageable, for all involved?
 - How might PI Adams' central role as project coordinator be lightened?
 - How might the society partners find ways to spread the required time and developed expertise broadly among staff?
 - How might additional support and guidance be given to Change Agents so that their engagement is most effective and national reach is obtained?
- 2. COMMUNICATION: How might project communications support better information-sharing among the right people?
 - How might information in the project be best shared to generate collective action and understanding among change agents and PIs, given how rapidly the project is evolving? I observe that often people are unaware of where to find information or of new processes.
 - How might coherent strategy be developed among societies and change agents (e.g. a national outreach plan) to provide adequate coverage (e.g. adequate reach of faculty across institutions) and avoid missed opportunities (like Teacher Appreciation Week).
- 3. PROFESSIONAL DEVELOPMENT: How might the right people get the expertise they need about implementing GFO effectively?
 - How might change agents improve their skills? There are plans to introduce them to the Fidelity of Implementation; is this adequate? How might change agents learn more about what one another are doing and get feedback?
 - How might champions learn effective implementation strategies and get feedback?
- 4. SCALING: How might the project define and achieve the desired scale?
 - To what degree is GFO's inclusive coordination adequate to achieve scale? Is there more, or less, directed (top down) coordination required? For example, if advisors are a significant audience, should there be direct engagement with professional societies for advisors? How might more undirected (emergent) networks among local champions be developed? What might entice such energetic engagement and social networks?
 - What types of project impacts are most highly valued, beyond reach of numbers (e.g. depth of engagement, apprentice models)? Does this vary by discipline?
 - How might national campaigns ensure they are attending to critical elements of the persuasion (i.e. Fidelity of Implementation)?

* What opportunities for training and professional development has the project provided?

Research Team - During our efforts to learn more about how to develop emotionally compelling messaging and engaging resources, the research team has been reading books and attended a workshop on Sticky Messages.

Post-Doctorial Researchers - The project has hired two post-docs, who work with PI Adams at the Colorado School of Mines. Neither came to the project with formal training in Physics Education Research (PER). Logan is a biophysicist by training and has a strong interest in transitioning to PER. Breakall is a chemistry education researcher by training and is looking to expand his quantitative skills. Adams, a seasoned physics education researcher, is leading their training through both regular project research activities and a separate reading group which dives into the literature. Additionally, Breakall and Logan are each responsible for hiring and mentoring an undergraduate research assistant to help with their respective projects. Finally, Adams is supporting their growth as research professionals providing training related to all aspects of project management. Specifically, we are focusing on task planning and time estimates. Each term we plan out all research activities and estimate how long we expect them to take. Then all researchers track their time daily by project and report back at the end of the term. As we plan the following term, we now have data to base our estimates on.

Faculty Sabbatical - Fall 2019 Brian Pyper worked jointly with the PhysTEC project and GFO for his sabbatical. During his work with GFO, Adams trained Pyper in the technique of reduced-basis factor analysis which Pyper performed on the PTaP.HE to determine the categories of faculty thinking.

Professional Development for faculty - The key mechanism by which this project hopes to accomplish its goals is to work with faculty to increase their knowledge of the teaching profession. This is being done predominantly through workshops conducted by and ongoing support from the disciplinary Change Agents who have been trained by PI Adams. These interactions are supported by a range of print and media research-based and user-tested resources developed by the project.

Project Management Professional Development - Both co-PI Plisch and external evaluator Chasteen have extensive experience in managing projects of this scope and are serving as mentors for PI Adams in this area.

Undergraduate Research Assistants - The project has hired several undergraduate researchers who have worked on various aspects of the project including teacher salary data mining, analysis of perceptions data, survey data collection and writing of the site reports. These undergraduates are being trained and supported by PI Adams and both post-docs.

* How have the results been disseminated to communities of interest? If so, please provide details.

The project disseminates its results and reaches out to the chemistry, math, physics and STEM teacher preparation communities in a variety of ways, including newsletters, brochures, websites, articles, and activities at national and regional meetings.

The research team has shared research results and conducted workshops at several national and regional meetings including the

- Noyce Western Regional Conference in Portland, OR.
- Physics Education Research Conference 2019, Provo, UT
- AAPT National Summer and Winter meetings in Provo, UT and Orlando, FL respectively
- PhysTEC 2020 National Conference in Denver, CO

The research team has also shared the resources via workshops and presentations to the following venues:

- Colorado School of Mines faculty during the annual site visit
- California State University, Long Beach faculty during the annual site visit
- Brigham Young University three faculty groups during the annual site visit
- West Virginia University advisors virtually
- Several large student gatherings at Colorado School of Mines
- Mines Foundation event for Alumni

Publications -

- The first peer-reviewed research paper was published this year through the PERC 2019 Conference Proceedings.
- Four manuscripts were submitted to the PERC 2020 Conference Proceedings.

American Physical Society

APS has disseminated the GFO resources to communities of interest during Yr2 through several mechanisms including:

- Supporting the team of physics change agents
- Engaging local faculty champions via the PhysTEC member institutions (more than 700 potential faculty champions in 331 different physics departments) through regular emails and the national PhysTEC conference.
- Recruiting a total of 23 quantitative study sites in physics departments, and another 3-5 sites with joint math/physics or chemistry/physics departments
- Leading workshops and giving presentations at national and regional meetings
 - AAPT National Summer and Winter meetings in Provo, UT and Orlando, FL respectively
 - Annual PhysTEC National Conference in Denver, CO
 - AAPT Ohio Section Meeting
 - Utah Valley University
 - Rowan Area Physics Teachers
- Implementing a national marketing campaign to the broader physics community which began in Yr2 via email
- Redesign of the GFO website

American Chemical Society

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ACS's areas of dissemination emphasis during Yr2 included the following categories of activities.

- Supporting a team of chemistry change agents
- Hosting live and virtual GFO workshops and presentations
- Creating a web presence for GFO at <u>www.acs.org/getthefactsout</u>
- Disseminating information about GFO more broadly

The majority of these activities are detailed in the "Products" section of this report. GFO was promoted through

- The ACS National Meeting in San Francisco, CA (August 2019) via
 - The Education booth
 - The Society Committee on Education executive Committee Meeting
 - A symposium
 - The Education booth at the ACS Leadership Institute in Atlanta, GA (January 2020).
 - Two virtual webinars to the ACS Society Committee on Education
 - Four publications including an article in the Journal of Chemical Education

Mathematical Association of America

MAA engaged with GFO through the summer of 2019. There efforts included sharing GFO resources through the following national venues

- Mathfest at the National MAA summer meeting
- Article in the April 2020 MAA Focus

Additionally, Mathematics Change Agents shared the GFO resources with students and colleagues at their own institutions.

See report for grant # 1821462

* What do you plan to do during the next reporting period to accomplish the goals?

The following is our 20/21 Academic year strategic plan which outlines in detail our plans for the coming year.

Year 3 Top Priority Initiatives:

- 1. Work towards a reliable way to identify GFO Champions and track their activities (with an emphasis on study sites where additional data sources can help to assess reliability)
- 2. Enhance support for study sites to implement GFO campaigns, and begin to assess effectiveness of this support
- 3. Coordinate Change Agent workshops across the project (Drew will do this)
- 4. Achieve adequate national scale through the national campaigns
- 5. Use items 1 4 above to begin answering the question of Scaling: How might the project define and achieve the desired scale?
- 6. Develop faculty-facing resources (videos, brochure, poster)

Year 3 Strategic Plan AY 20/21

Working Group	Fall (Sep - Dec)	Spring (Jan - Apr)	Summer (May - Aug)
PI Team	 Hold Annual Meeting, and present and discuss plans for AY20-21 Approve NAB report response Approve plan to seek additional funding Check in on WG progress on this plan 	 Write NSF Annual Report Approve Communications Strategy and Branding Strategy Check in on WG progress on this plan Review plan for achieving desired scale 	 Approve AY21-22 Strategic Plan Approve NAB/Annual Meeting agendas Hold virtual NAB Meeting Check in on WG progress on this plan
Planning and Management	 Build a partnership with HBCUTeach Draft NAB report response and make plans to integrate feedback Draft a plan for beginning to answer the question of Scaling Seek additional funding 	 Schedule NAB/Annual Meetings Plan NSF Annual Report Seek additional funding 	 Draft AY21-22 Strategic Plan Draft NAB/Annual Meeting agendas Edit and submit NSF Annual Report
Communications	 Roll out Communications Strategy to key stakeholders 	 Monitor Communications Strategy implementation and revise as needed 	 Monitor Communications Strategy implementation and revise as needed
Societies	 Implement revised marketing plans Maintain online fora Publish Fall Newsletters (2) Organize 1-2 virtual meetings for Qualitative (and Quantitative?) Sites Develop strategy 	 Implement marketing plans Maintain online fora Publish Spring Newsletters (2) Organize 1-2 virtual meetings for Qualitative (and Quantitative?) Sites 	 Assess and revise marketing plans Assess and revise online fora Publish Summer Newsletter (1) Revise plan to engage Quantitative and Qualitative Sites Engage Qualitative Sites to develop plans for AY21-22
Change Agents by Discipline	 Reach out to ~10 new institutions per Change Agent (eg. Host ~1 National/Regional workshop for your discipline) Report activities via the tracking form and utilize evaluation surveys for each presentation Submit at least 1 self-assessment per semester Support adopted GFO Champions Continue to implement local efforts and provide written feedback to Toolkit WG Attend All Change Agent Meeting Create 1-2 blog articles for the website 	 Reach out to ~10 new institutions per Change Agent (eg. Host ~1 National/Regional workshop for your discipline) Support adopted GFO Champions Continue to implement local efforts and provide written feedback to Toolkit WG Attend All Change Agent Meeting Create 1-2 blog articles for the website 	 Create plans for AY21-22 workshops and adopted Champion support Create plans for AY21-22 local efforts
Toolkit Design and Website Development	 Finalize Student-facing and faculty-facing 2.0 brochures Hold All Change Agent meeting and share Fidelity of Implementation checklist 	 Develop faculty-facing poster and other resources Hold All Change Agent meeting AMTE GFO Kickoff at annual meeting 	 Create 2-4 blog articles for the website Maintain website

	 Host virtual AMTE Task Force KickOff Develop 6 two-minute videos Create 2-4 blog articles for the website Maintain website Continue to build out <i>Facts and Data</i> Post 5-10 blog articles from various WGs Finalize Champion Support plan. Maintain Champion listing on the website 	 Create 2-4 blog articles for the website Maintain website Continue to build out <i>Facts and Data</i> Post 5-10 blog articles from various WGs Maintain Champion listing on the website 	 Update materials based on feedback collected over the year Maintain Champion listing on the website
Research Team	 T⁴ Research schedule development Qual Site visits (4 sites) Quant Site: Fall data collection Quant reports of Sp yr 2 data collection Direct recruitment of MSI Quant sites Publish PTaP paper Draft PTaP.HE paper Share Salary Data with each Quant site Create 4-6 blog articles for the website PER PD 	 T⁴ Research schedule development Qual Site visits (2 sites) Analyze yr 1&2 data to inform project Create 4-6 blog articles for the website PER PD Publish PTaP.HE paper Quant reports of Fall yr 2 data collection Quant sites: Spring data collection Attend and present at PhysTEC conference Attend and present at AAPT Regional Meeting 	 Write PERC papers Present at Summer AAPT/PERC and BCCE Quant reports of Sp yr 3 data collection Create 3-5 blog articles for the website PER PD
Evaluation	 Observe 1-2 workshops or webinars Continue to administer workshop surveys Begin evaluation of local champion activities (e.g. Activity tracking, workshop surveys, initial interviews or surveys of champions) Roll out Fidelity of Implementation rubric broadly and collect data Plan a survey of people engaged in GFO (listserv, forums) for Spring Create 1-2 blog articles for the website Pl Interviews (?) 	 Observe 1-2 workshops or webinars Continue to administer workshop surveys, activity tracking. Do preliminary analysis of champion data (registration forms, any survey, etc.) Conduct survey of GFO engaged people (listservs, forums), and interview/survey champions. Create 1-2 blog articles for the website 	 Analyze FSI data Analyze champion survey data Interview / focus groups with change agents Detailed analysis of all workshop survey data

Supporting Files

- 1. Evaluation Report prepared by Chasteen Educational Consulting for GFO Year 2 activities <u>GFO 2020 Annual</u> <u>Evaluation Report-061820.pdf</u>
- 2. Evaluator report of faculty-facing presentations or workshops with pre/post data Pre-Post Presentation Reports.pdf

Did you know that around half of science and math majors have an interest in grade 7-12 teaching?

Exciting new results from the GFO research team supports this finding and indicates that there is a large pool of prospective teachers in the United States! Through analyzing the responses from nearly 2,000 undergraduate students to seven survey questions related to their desire to teach, we found that nearly 55% were ether planning to pursue teacher certification or held some level of interest in teaching.

Below is a pictogram showing the level of teaching interest throughout the country from our 2019 data. We have also sent out individualized pictograms to our study sites showing them the level of interest among students who completed the survey at their specific institutions.



Pictogram of Prospective Teachers: 2019 National (n=1960)

Planning to Pursue Certification includes those who answered agree/strongly agree (A/SA) to either "I plan to pursue certification at my institution" or "I plan to pursue certification through another route". Has Interest includes those who A/SA with any of the four I would if (IWIf) statements and/or those who answered A/SA to "I want to become a grade 7-12 teacher" (WTT) but did not A/SA with either certification statement. Neutral includes those remaining who chose neutral on any one of WTT, either certification statement, or IWif statement. Doesn't Want to Teach includes those who D/SD with all seven statements – WTT, certification, and IWif statements.

Any opinions, findings, and conclusions or recommendations expressed in this material are those of the author(s) and do not necessarily reflect the views of the National Science Foundation. NSF DUE #1821710 & 1821462.



4. Data visualization and category organization of the GFO national year 1 student and faculty perceptions data (2 figures)

Figure 1

PTaP.HE: Data visualization for story telling:

Knowledge of facts about the teaching profession

- Facts about Teaching 5.7 (50% interest, pays less, pay faculty, 79%, competitive benefits, colleague relationships, parent respect)
- Salary Accuracy- 8.9 (starting teacher pay, starting other pay, mid-career teacher pay)

What it's like to teach

- Teaching is a Good Career 5.3 (pays less, more stressful, classroom management, enjoyable, retention, parent respect)
- Teacher Satisfaction 4.7 (colleague relationships, control, enjoyable, retention, parent respect)

Opinion of those who are currently teachers

 Respects the Profession – 6.3 (discuss, enjoyable, weaker students, scientists, proud as faculty, be for a semester)

Department reported advising and support of teaching as a career choice

- Advising & Support 5.7 (discuss, 1 colleague, name and contact, others discuss, students encouraged, 50% interest, STEM career)
- Teaching Advocate 5.1 (discuss career options, discuss teaching, fulfilling, discourage majors, give up scientist, proud as faculty)

Faculty preference for their students' careers

- Teaching is a STEM Profession 5.7 (weaker students, happier if professor, STEM career, give up scientist, proud as faculty)
- Faculty Support 4.8 (fulfilling, discourage majors, too much time, another career first)
- Career Options 9.6 (fulfilling, best to industry, best to teaching)

Interpreting the graph

- The top five categories are Faculty perceptions of teachers and their careers
- The lower five categories are Faculty perceptions of advising and student career options

Benchmark: A model department was created with a well-informed champion, 4 supportive faculty, 1 indifferent faculty. This department has a healthy teacher recruitment environment but is not exemplary.

Faculty Perceptions of Grade 7-12 Math and Science Teaching (n=495)



PTaP data visualization for the Get the Facts Out project

The Get the Facts Out project plots seven of the eleven empirical categories of the PTaP on a radar plot to help departments see how their students perceive support for teaching in their department compared to how students perceive teaching careers.

Support for Teaching

III. Others Support Me Teaching (department proud, advisor encourage, I proud, peers supportive, family supportive, professors supportive)

V. My Department Supports Me Teaching (department proud, advisor encourage, peers supportive, professors supportive)

IV. My Department Values and Encourages Teaching (1 professor thinks valuable, know who to talk to, department proud, professors discuss teaching, professors encourage)

Teaching Careers

 Personal Enjoyment (good career for me, fulfilling for me, day-to-day, bored, want to teach, pursue cert at IHE, teens)

II. As a Career Choice (not make most of degree, give up scientist, try another career, weaker students, good career in general, I proud, intellectually stimulating, bored)

VI. Employee benefits and Stability (competitive benefits, retire comfortably, stable career)
 VII. Teaching is Scientific (give up scientist, teaching is scientific, weaker students, good career in general, intellectually stimulating)



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Products

Books

Book Chapters

Inventions

Journals or Juried Conference Papers

View all journal publications currently available in the <u>NSF Public Access Repository</u> for this award. The results in the NSF Public Access Repository will include a comprehensive listing of all journal publications recorded to date that are associated with this award.

Adams, W. K. and Plisch, M. and Plantt, T.. (2019). Have a passion for teaching? Consider high school teaching. *American Journal of Physics*. 87 (5) 328 to 329. Status = Added in NSF-PAR <u>doi: 10.1119/1.5094433</u>
 Federal Government's License = Acknowledged. (Completed by Adams, Wendy on 06/23/2019)

Licenses

Other Conference Presentations / Papers

Savannah Logan, Richard L. Pearson III, Wendy K. Adams (2019). *A New Survey: Faculty Perceptions of Teaching as a Profession*. American Association of Physics Teachers Winter 2019 Meeting. Houston, TX. Status = OTHER; Acknowledgement of Federal Support = Yes

David May, Monica Plisch (2020). A Theory of Change for Getting the Facts Out*. American Association of Physics Teachers Winter 2020 Meeting. Orlando, FL. Status = OTHER; Acknowledgement of Federal Support = Yes

Drew Isola (2019). *BG04 How Can AAPT Members Support 'Get the Facts Out'*?. AAPT WM 19. Houston, TX. Status = OTHER; Acknowledgement of Federal Support = Yes

Wendy K. Adams (2019). *BG05 Get the Facts Out: Understanding the Impact on Diverse Populations*. AAPT WM 19. Houston, TX. Status = OTHER; Acknowledgement of Federal Support = Yes

Vince Kuo (2019). *BG06 Getting the Facts Out About the High School Teaching Career*. AAPT WM 19. Houston, TX. Status = OTHER; Acknowledgement of Federal Support = Yes

Jennifer Nielson (2018). *Blow Minds. Teach Science or Math.*. College Advisement Committee Meeting. Brigham Young University, Provo, UT. Status = OTHER; Acknowledgement of Federal Support = Yes

Savannah Logan and Wendy K. Adams (2019). *Busting Myths about the Teacher Profession, STEM Careers Course*. GFO Initial Site Visit. Chicago State University, Chicago, IL. Status = OTHER; Acknowledgement of Federal Support = Yes

Savannah Logan, Dawson Lang, Jacob Bowytz. (2019). *Busting Myths about the Teaching*. Colorado School of Mines Summer Multicultural Engineering Training Week 1. Golden, CO. Status = OTHER; Acknowledgement of Federal Support = Yes

Kristine E. Callan and Savannah Logan (2019). *Busting Myths about the Teaching Profession*. Engineering Physics Field Session. Golden, CO. Status = OTHER; Acknowledgement of Federal Support = Yes

Richard L. Pearson III (2019). *Busting Myths about the Teaching Profession*. Chemistry Field Session Chemistry. Golden, CO. Status = OTHER; Acknowledgement of Federal Support = Yes

Richard L. Pearson III. (2019). *Busting Myths about the Teaching Profession*. Mining and Metallurgical Engineering Field Session. Golden, CO. Status = OTHER; Acknowledgement of Federal Support = Yes

Kristine E. Callan and Dawson Lang (2019). *Busting Myths about the Teaching Profession*. Colorado School of Mines Summer Multicultural Engineering Training. Golden, CO. Status = OTHER; Acknowledgement of Federal Support = Yes

Savannah Logan (2019). *Busting Myths about the Teaching Profession*. Mathematics Field Session. Golden, CO. Status = OTHER; Acknowledgement of Federal Support = Yes

Savannah Logan, Dawson Lang, and Jacob Bowytz (2019). Busting Myths about the Teaching Profession. Colorado School of Mines Summer Multicultural Engineering Training Week 3. Golden, CO. Status = OTHER; Acknowledgement of Federal Support = Yes

Rose Mary Zbiek (2019). *Busting Myths about the Teaching Profession*. First year seminar for mathematics majors at Penn State (University Park campus). University Park, PA. Status = OTHER; Acknowledgement of Federal Support = Yes

Savannah Logan, Dawson Lang, and Jacob Bowytz (2019). Busting Myths about the Teaching Profession.. Colorado School of Mines Summer Multicultural Engineering Training Week 2. Golden, CO. Status = OTHER; Acknowledgement of Federal Support = Yes

O'Brennan, B. & Logan, S. L. (2020). Busting myths about the teaching Profession. Physics Teaching Techniques Course – Colorado School of Mines. Golden, CO. Status = OTHER; Acknowledgement of Federal Support = Yes

Wendy K. Adams (2019). *Busting myths about the teaching profession*. TEA student club. Colorado School of Mines, Golden, CO. Status = OTHER; Acknowledgement of Federal Support = Yes

Wendy Adams, Jared Breakall, Duane Merrell, Jennifer Nielson, (2020). *Busting myths about the teaching profession*. Provo Site Visit. Provo, Utah. Status = OTHER; Acknowledgement of Federal Support = Yes

Ellen Yezierski (2019). *Career Exploration: High School Chemistry Teaching*. First year seminar for CHM and BCHM majors. Miami University. Status = OTHER; Acknowledgement of Federal Support = Yes

Logan, S. L., Breakall, J. B., Pearson III, R. L., and Adams, W. K. (2020). *College faculty support for grade 7-12 teaching careers: Survey results and comparisons to student perceptions*. 2020 Physic Education Research Conference Proceedings. . Status = UNDER_REVIEW; Acknowledgement of Federal Support = Yes

Drew Isola, Allie Costley, Wendy K. Adams (2020). Data mining: Helping faculty share an accurate picture of the teaching profession in their region. 2020 Physic Education Research Conference Proceedings. . Status = UNDER_REVIEW; Acknowledgement of Federal Support = Yes

Kristine E. Callan and Wendy K. Adams (2018). *Enhancing the Perception of Secondary Teaching*. Get the Facts Out KickOff. Golden, CO. Status = OTHER; Acknowledgement of Federal Support = Yes

Adams, W. K., Breakall, J. B., and Logan, S. L. (2020). *Faculty Perceptions of the Teaching Profession: PTaP.HE categorization, interpretation, and setting a benchmark*. PhysTEC Annual Conference. Denver, CO. Status = OTHER; Acknowledgement of Federal Support = Yes

Breakall, J. B., Pearson, R. P. III, Logan, S. L., & Adams, W. K. (2020). *Faculty's Perceptions of 7-12 Teaching as a Career: Changing the Conversation Around Physics Teacher Recruitment*. PhysTEC Annual Meeting 2020. Denver, CO. Status = OTHER; Acknowledgement of Federal Support = Yes

Savannah Logan and Wendy K. Adams (2020). *GFO Copywrite: Development and Testing of Materials for Recruiting STEM Teachers*. American Association of Physic Teachers Winter Meeting 2020. Orlando, FL. Status = OTHER; Acknowledgement of Federal Support = Yes

Terri Chambers, Jennifer Nielson, Ellen Yezierski (2019). *GFO Informational Presentation for ACS Society Committee on Education*. ACS National Meeting. San Diego, CA. Status = OTHER; Acknowledgement of Federal Support = Yes

Drew Isola (2020). *GFO Invited Speaker Session*. AAPT Winter Meeting 2020. Orlando, FL. Status = OTHER; Acknowledgement of Federal Support = Yes

Pearson, R. L.III, Logan, S. L. & Adams, W. K. (2019). *GFO PTaP 2019: Preliminary Scores and Analysis*. American Association of Physics Teachers Winter 2020 Meeting. Orlando, FL. Status = OTHER; Acknowledgement of Federal Support = Yes

Terri Chambers, Jennifer Nielson (2019). *GFO Symposium*. Symposium at ACS National Meeting. San Diego, CA. Status = OTHER; Acknowledgement of Federal Support = Yes

Terri Chambers, Ellen Yezierski, Jennifer Nielson, Willy Hunter, Etta Gravely, Stephanie Ryan (2019). *GFO Webinar*. ACS Society Committee on Education. Webinar. Status = OTHER; Acknowledgement of Federal Support = Yes

S. L. Logan, R. L. Pearson III, and W. K. Adams (2019). *GFO copywrite: development and testing of written and visual materials for recruiting* STEM teachers. 2019 PERC Proceedings. . Status = PUBLISHED; Acknowledgement of Federal Support = Yes Drew Isola (2020). *GFO resources discussion in the K12 lounge*. AAPT Winter Meeting 2020. Orlando FL. Status = OTHER; Acknowledgement of Federal Support = Yes

Karen Magee-Sauer (2019). GFO to Guide Community College Students to HS STEM Teaching Invited. American Association of Physics Teachers Summer Meeting 2019. Provo, UT. Status = OTHER; Acknowledgement of Federal Support = Yes

Terri Taylor (2018). *Get the Facts Out*. ACS National Meeting, ACS Society Committee on Education executive meeting. Boston, MA. Status = OTHER; Acknowledgement of Federal Support = Yes

Ellen Yezierski (2018). *Get the Facts Out*. Miami University in Ohio, Introductory seminar for first-year chemistry and biochemistry majors. Oxford, OH. Status = OTHER; Acknowledgement of Federal Support = Yes

Jennifer Nielson (2018). Get the Facts Out. Deans of Education Meeting. Brigham Young University, Provo, UT. Status = OTHER; Acknowledgement of Federal Support = Yes

Etta Gravely (2019). *Get the Facts Out*. Symposium/Colloquium Class for chemistry and biology majors. North Carolina A&T State University, Greensboro, N. Status = OTHER; Acknowledgement of Federal Support = Yes

Terri Chambers (2019). *Get the Facts Out*. ACS National Meeting, Society Committee on Education Executive Committee Meeting. San Diego, CA. Status = OTHER; Acknowledgement of Federal Support = Yes

Isola, D., Adams, W. K., Pearson, R. P. III, & Logan, S. L. (2019). *Get the Facts Out*. American Association of Physics Teachers Summer 2019 Meeting. Provo, UT. Status = OTHER; Acknowledgement of Federal Support = Yes

Drew Isola (2019). Get the Facts Out (round-table discussion in High School Teacher Lounge). AAPT WM 19. Houston, TX. Status = OTHER; Acknowledgement of Federal Support = Yes

Wendy K. Adams, Rebecca Vieyra and Kristine Callan (2018). Get the Facts Out (round-table discussion in High School Teacher Lounge). AAPT SM 18. Washington, D.C. Status = OTHER; Acknowledgement of Federal Support = Yes

Willy Hunter (2019). Get the Facts Out Faculty Toolkit Trial. StemEd Center Faculty Meeting. Illinois State University, Normal, IL. Status = OTHER; Acknowledgement of Federal Support = Yes

Wendy K. Adams, Monica Plisch (2018). Get the Facts Out Project Vision and Theory of Change, Get the Facts Out KickOff. Workshop. Colorado School of Mines, Golden, CO. Status = OTHER; Acknowledgement of Federal Support = Yes

Terri Chambers, Etta Gravely, Jennifer Nielson, Willy Hunter, Stephanie Ryan, Ellen Yezierski (2020). *Get the Facts Out Webinar*. Webinar. Webinar. Status = OTHER; Acknowledgement of Federal Support = Yes

Karen Magee-Sauer (2019). Get the Facts Out about STEM Teaching. Workshop for STEM faculty. Rowan College of Gloucester County, Sewell, NJ. Status = OTHER; Acknowledgement of Federal Support = Yes

Duane Merrell (2019). *Get the Facts Out about STEM Teaching*. Workshop of STEM students and faculty. Brigham Young University, Provo, UT. Status = OTHER; Acknowledgement of Federal Support = Yes

Karen Magee-Sauer (2020). Get the Facts Out about STEM Teaching. Workshop for physics teachers. Rowan Area Physics Teachers meeting. Glassboro, NJ. Status = OTHER; Acknowledgement of Federal Support = Yes

Duane Merrell (2019). *Get the Facts Out about STEM Teaching*.. Workshop for STEM students and faculty at Utah Valley University. Provo, UT. Status = OTHER; Acknowledgement of Federal Support = Yes

Kristine E. Callan, Adria Brown, Nicholas Dyer, and J. Hunt (2019). *Get the Facts Out: Benefits Compared to Industry and University Teaching*. Western Regional Noyce Summit 2019. Tuscon, AZ. Status = OTHER; Acknowledgement of Federal Support = Yes

Kristine E. Callan, Gay Stewart, and Wendy K. Adams (2018). Get the Facts Out: Benefits Compared to Industry and University Teaching. Noyce National Summit 2018. Washington, D.C.. Status = OTHER; Acknowledgement of Federal Support = Yes

Wendy K. Adams (2019). *Get the Facts Out: Building a local GFO campaign*. PhysTEC 2019. Boston, MA. Status = OTHER; Acknowledgement of Federal Support = Yes

Etta Gravely, Dr. Calisha Petty (2020). *Get the Facts Out: Busting Myths about the Teaching Profession*. Chemistry Colloquium Class for majors at North Carolina A & T State University. Greensboro, NC. Status = OTHER; Acknowledgement of Federal Support = Yes

Wendy K. Adams (2019). *Get the Facts Out: Changing the Conversation About Teaching*. American Association of Physics Teachers Summer Meeting 2019. Provo, UT. Status = OTHER; Acknowledgement of Federal Support = Yes

Wendy K. Adams (2019). *Get the Facts Out: Changing the Conversation around STEM Teacher Recruitment*. American Physical Society March Meeting. Boston, MD. Status = OTHER; Acknowledgement of Federal Support = Yes

Wendy K. Adams (2019). *Get the Facts Out: Changing the Conversation around STEM Teacher Recruitment*. PhysTEC Annual Conference. Boston, MD. Status = OTHER; Acknowledgement of Federal Support = Yes

Wendy K. Adams, Kristine Callan (2019). *Get the Facts Out: Changing the conversation around STEM teacher recruitment*. American Association of Physics Teachers Summer 2018 Meeting. Washington, D.C.. Status = OTHER; Acknowledgement of Federal Support = Yes

Etta Gravely, Ginger Redd (2019). *Get the Facts Out: Myths and Misperceptions About the Teaching Profession*. "Biology Orientation Class at North Carolina A & T State University. Greensboro, NC. Status = OTHER; Acknowledgement of Federal Support = Yes

Wendy K. Adams, Savannah Logan (2019). *Get the Facts Out: Start your own campaign*. Workshop. West Virginia University, Morgantown, WV. Status = OTHER; Acknowledgement of Federal Support = Yes

Wendy K. Adams, Savannah Logan (2019). *Get the Facts Out: Start your own campaign*. Workshop. California State University, Long Beach, CA. Status = OTHER; Acknowledgement of Federal Support = Yes

Wendy K. Adams, Savannah Logan (2019). *Get the Facts Out: Start your own campaign*. Get the Facts Out: Start your own campaign. Brigham Young University, Provo, UT. Status = OTHER; Acknowledgement of Federal Support = Yes

Wendy K. Adams, Savannah Logan (2019). *Get the Facts Out: Start your own campaign*. Workshop. University of Wisconsin – La Crosse, La Crosse, WI. Status = OTHER; Acknowledgement of Federal Support = Yes

Wendy K Adams, Richard L Pearson III, Savannah Logon (2019). *Get the Facts Out: Understanding the impact on diverse populations*. American Association of Physics Teachers Winter 2019 Meeting. Houston, TX. Status = OTHER; Acknowledgement of Federal Support = Yes

Wendy K. Adams and Adria Brown (2018). Get the Facts Out: What is the teaching profession actually like?. Mines First Year Student Orientation. Golden, CO. Status = OTHER; Acknowledgement of Federal Support = Yes

Etta Gravely, Ginger Redd (2019). *Get the Facts Out: Workshop for Chemistry Faculty*. Faculty Meeting. Greensboro, North Carolina. Status = OTHER; Acknowledgement of Federal Support = Yes

Gay Stewart (2019). Get the Facts Out: Workshop for physics faculty. Fall Meeting Ohio Section AAPT. Gates Mills, OH. Status = OTHER; Acknowledgement of Federal Support = Yes

Mark Hannum (2020). *Getting the Facts Out About STEM Teaching Professions*. American University Physics Department Colloquium. Washington, DC. Status = OTHER; Acknowledgement of Federal Support = Yes

Rose Mary Zbiek (2019). *Getting the Facts Out: Countering Negative Messages about Teaching as a Career*. Pennsylvania Association of Mathematics Teacher Educators Annual Symposium. Shippensburg, PA. Status = OTHER; Acknowledgement of Federal Support = Yes

Peer-reviewed (2019). *Help Us Get the Facts Out to Recruit More Teachers*. Workshop for faculty. UTeach Annual Meeting, Austin, TX. Status = OTHER; Acknowledgement of Federal Support = Yes

Etta Gravely, Dr. Calisha Petty (2020). *How Much Do You Really Know About the Teaching Profession*. Freshman and Sophomore Chemistry Colloquium Classes at North Carolina A & T State University. Greensboro, NC. Status = OTHER; Acknowledgement of Federal Support = Yes

Wendy K. Adams, R. Vieyra (2018). *Improving the Perceptions of STEM Teaching*. 100Kin10 Webinar. . Status = OTHER; Acknowledgement of Federal Support = Yes

L Jodi Wesemann, C. Joerg Schlatterer, Corrie Kuniyoshi, Terri Taylor Chambers. (2019). *Learning across disciplines: Addressing teacher recruitment, career development, and graduate student diversity through partnerships*. Gordon Research Conference, Chemistry Education Research and Practice. Lewiston, ME. Status = OTHER; Acknowledgement of Federal Support = Yes

Breakall, J. B., Logan, S. L., Pearson III, R. L., Pyper, B. and Adams, W. K. (2020). *Maybe we aren't that different after all: Faculty perceptions* of grade 7-12 teaching as a career. 2020 Physic Education Research Conference Proceedings. . Status = UNDER_REVIEW; Acknowledgement of Federal Support = Yes

Judith Covington, Christina Eubanks-Turner, Ben Ford, Timothy Hendrix, Rose Mary Zbiek (2020). *My Best Student Wants to Teach*!. MAA Focus. MAA Focus. Status = OTHER; Acknowledgement of Federal Support = Yes

Etta Gravely, Ginger Redd (2019). *Myths & Misperceptions About Teaching*. Chemistry Colloquim Class for majors at North Carolina A &T State University in Greensboro, NC. Greensboro, NC. Status = OTHER; Acknowledgement of Federal Support = Yes

Drew Isola, Wendy K. Adams, Savannah Logan, Duane Merrell (2020). *New Resources for Getting the Facts Out About STEM Teaching Professions*. PhysTEC Conference. Denver, CO. Status = OTHER; Acknowledgement of Federal Support = Yes

Drew Isola, Wendy K. Adams (2020). Overcoming obstacles in implementing materials that combat misperceptions about the teaching profession. PhysTEC conference. Denver, CO. Status = OTHER; Acknowledgement of Federal Support = Yes

Savannah Logan, Richard Pearson, Wendy K. Adams (2019). *Perceptions of the Teaching Profession at Universities Across the US*. American Association of Physics Teachers Summer 2019 Meeting. Provo, UT. Status = OTHER; Acknowledgement of Federal Support = Yes

Savannah Logan (2019). *Perceptions of the Teaching Profession at Universities Across the United States*. AAPT Summer 2019 Meeting. Provo, UT. Status = OTHER; Acknowledgement of Federal Support = Yes

Savannah Logan (2019). Poster- GFO Copywrite: Development and Testing of Written and Visual Materials for Recruiting STEM Teachers. Noyce Summit 2019. Washington, DC. Status = OTHER; Acknowledgement of Federal Support = Yes

Savannah Logan (2019). Poster- GFO Copywrite: Development and Testing of Written and Visual Materials for Recruiting STEM Teachers. PERC 2019. Provo, UT. Status = OTHER; Acknowledgement of Federal Support = Yes

Wendy K. Adams, Savannah Logan, and Richard Pearson (2020). *Research Design of the Get the Facts Out Project*. American Association of Physic Teachers Winter Meeting 2020. Orlando, FL. Status = OTHER; Acknowledgement of Federal Support = Yes

Pearson III, R. L., Logan, S. L. and Adams, W. K. (2020). *Results of faculty interviews during the development of the Perceptions of Teaching as a Profession in Higher Education (PTaP.HE) instrument*.. 2020 Physic Education Research Conference Proceedings. . Status = UNDER_REVIEW; Acknowledgement of Federal Support = Yes

Duane Merrell (2019). *Secondary Physics Teaching: Let's Look at the Facts Invited*. American Association of Physics Teachers Summer Meeting 2019. Provo, UT. Status = OTHER; Acknowledgement of Federal Support = Yes

Vince Kuo (2020). *Share-a-Thon: Recruitment and Getting the Facts Out*. PhysTEC Annual Conference. Denver, CO. Status = OTHER; Acknowledgement of Federal Support = Yes

Vince Kuo, Drew Isola, Savannah Logan, Richard Pearson (2019). *Share-a-thon: Get the Facts Out*. PhysTEC19. Boston, MA. Status = OTHER; Acknowledgement of Federal Support = Yes

Vince Kuo (2019). So your son or daughter is thinking about teaching?. Orientation Step1: Launch - Multiple summer dates. Golden, CO. Status = OTHER; Acknowledgement of Federal Support = Yes

Vince Kuo (2019). So you're thinking about being a teacher eh? Here are a few things you should know.... Colorado Wyoming American Association of Physics Teachers Annual Meeting. Golden, CO. Status = OTHER; Acknowledgement of Federal Support = Yes

Wendy K. Adams (2018). *Starting a Local GFO Campaign*. Get the Facts Out KickOff. Golden, CO. Status = OTHER; Acknowledgement of Federal Support = Yes

Pyper, B., Logan, S. L., Pearson, R. P. III, Adams, W. K. (2020). *Statistical analyses of the PTaP.HE, a faculty perceptions instrument*. American Association of Physic Teachers Winter Meeting 2020. Orlando, FL. Status = OTHER; Acknowledgement of Federal Support = Yes

Terri Chambers, Kenetia Thompson (2019). *Symposium: Get the Facts Out: Faculty & Student Perceptions of K - 12 Teaching Careers*. ACS National Meeting. San Diego, CA. Status = OTHER; Acknowledgement of Federal Support = Yes

Adams, W. K., Plantt, T., and Norfleet, E. (2020). *Teach@Mines*. Teach@Mines Colorado School of Mines Foundation Lunch Bunch, Golden, CO. Virtual. Status = OTHER; Acknowledgement of Federal Support = Yes

Savannah Logan, Cherie Bornhorst, and Stephan Graham (2020). *Teach@Mines Busting myths about the teaching profession*. Teach@Mines Colorado School of Mines All Campus Event. Golden, CO. Status = OTHER; Acknowledgement of Federal Support = Yes

Wendy K. Adams (2019). *Teach@Mines Ice Cream Social*. All campus event for anyone interested in teaching. Colorado School of Mines, Golden, CO. Status = OTHER; Acknowledgement of Federal Support = Yes

Cami Benson, Wendy Adams and Blue O'Brennan (2018). *Teaching Myth Busters*. Get the Facts Out KickOff. Golden, CO.. Status = OTHER; Acknowledgement of Federal Support = Yes

Kristine E. Callan, Zabdiyel Tan, and Alyssa Teteris (2019). *Teaching Myth Busters*. Teacher Education Alliance Campus Wide Event. Golden, CO. Status = OTHER; Acknowledgement of Federal Support = Yes

Karen Magee-Sauer (2019). *Teaching Myth Busters: What is the teaching profession actually like?*. Workshop for STEM students.. Rowan College of Burlington County, Mt Laurel, NJ. Status = OTHER; Acknowledgement of Federal Support = Yes

Vince Kuo (2019). *Teaching Myth Busters: What is the teaching profession actually like?*. Workshop residence life staff. Colorado School of Mines, Golden, CO. Status = OTHER; Acknowledgement of Federal Support = Yes

Karen Magee-Sauer (2019). *Teaching Myth Busters: What is the teaching profession actually like?*. Workshop for STEM students. Rowan College of Burlington County, Mt. Laurel, NJ. Status = OTHER; Acknowledgement of Federal Support = Yes

Wendy K. Adams, Jared B. Breakall, Duane Merrell, Jennifer Nielson (2020). *Teaching! The best kept secret!*. Physics Department Meeting. Provo, Utah. Status = OTHER; Acknowledgement of Federal Support = Yes

Jared Breakall and Savannah Logan (2020). *Teaching, the best kept secret!*. Circuit Media, Denver, CO. Virtual. Status = OTHER; Acknowledgement of Federal Support = Yes

Wendy Adams, Jared Breakall, and Savannah Logan (2020). *Teaching, the best kept secret!*. West Virginia University Academic Advising Council, Morgantown, VA. Virtual. Status = OTHER; Acknowledgement of Federal Support = Yes

Savannah Logan and Wendy K. Adams (2020). *Teaching: The Best Kept Secret*!. California State University – Long Beach. Long Beach, CA. Status = OTHER; Acknowledgement of Federal Support = Yes

Adams, W. K., Breakall J. B., & Nielson, J. (2020). *Teaching: The Best Kept Secret*!. Brigham Young University Math and Science Advising. Provo, UT. Status = OTHER; Acknowledgement of Federal Support = Yes

Adams, W. K., Breakall J. B., & Nielson, J. (2020). *Teaching: The Best Kept Secret*!. Brigham Young University Chemistry and Mathematics Departments. Provo, UT. Status = OTHER; Acknowledgement of Federal Support = Yes

Wendy K. Adams and Savannah Logan (2019). *Teaching: The best kept secret*!. Teach@Mines Teacher Advisory Group. Golden, CO. Status = OTHER; Acknowledgement of Federal Support = Yes

Wendy K. Adams, Savannah Logan (2019). *Teaching: The best kept secret!*. GFO Site Visit Faculty Workshop. Golden, CO. Status = OTHER; Acknowledgement of Federal Support = Yes

Pearson, R. L., Cleveland, L., Adams W. K. (2019). *The Baseline Data of the PTaP & FPTaP*. American Association of Physics Teachers Summer 2019 Meeting. Provo, UT. Status = OTHER; Acknowledgement of Federal Support = Yes

Richard L. Pearson III and Savannah Logan. (2019). *The Beginning of a New Survey: Faculty Perceptions of Teaching as a Profession*. American Association of Physics Teachers Winter 2019 Meeting, ... Houston, TX. Status = OTHER; Acknowledgement of Federal Support = Yes

Kristine Callan (2020). *The Best Kept Secret!*. 2020 Western Regional Conference. Portland, OR. Status = OTHER; Acknowledgement of Federal Support = Yes

Wendy K. Adams (2018). *The PTaP Survey*. SoCal PhysTEC Network Inaugural meeting. Long Beach, CA. Status = OTHER; Acknowledgement of Federal Support = Yes

Pearson, R. L. III, Logan, S. L. & Adams, W. K. (2019). Understanding the Perception Radar Plots of the PTaP & PTaP.HE. American Association of Physics Teachers Winter 2020 Meeting. Orlando, FL. Status = OTHER; Acknowledgement of Federal Support = Yes

Gay Stewart (2019). Want More Students Excited About Teaching? Be a Change Agent! Invited. American Association of Physics Teachers Summer Meeting 2019. Provo, UT. Status = OTHER; Acknowledgement of Federal Support = Yes

Rose Mary Zbiek (2019). What is GFO and how can I engage mathematics education colleagues in the state. Mathematics Education Faculty Group. Port Matilda, PA. Status = OTHER; Acknowledgement of Federal Support = Yes

Christina Eubanks-Turner (2019). *Why you consider a career in math teaching*. Presentation. Loyola Marymount University, Los Angeles, CA. Status = OTHER; Acknowledgement of Federal Support = Yes

Wendy K. Adams, Savannah Logan (2019). *Workshop*. Get the Facts Out: Start your own campaign. Chicago State University, Chicago, IL. Status = OTHER; Acknowledgement of Federal Support = Yes

Judith Covington (2019). Workshop- Get the Facts Out. LA/MS Section of the MAA meeting. Jackson, MS. Status = OTHER; Acknowledgement of Federal Support = Yes

Ben Ford (2019). *Workshop: Get the Facts Out: Changing the Conversation About Teaching*. Department of Mathematics and Statistics. Sonoma State University Rohnert Park, CA. Status = OTHER; Acknowledgement of Federal Support = Yes

Judith Covington and Ben Ford (2019). Workshop: Get the Facts Out: Changing the Conversation About Teaching. National Inquiry-Based Learning and Teaching Conference. Denver, CO. Status = OTHER; Acknowledgement of Federal Support = Yes

Other Products

Educational aids or Curricula

- "Teaching: The best kept secret!" is version 2 of our faculty-facing presentation. It is designed for advisors or faculty, basically anyone who may talk with students about their career choices. The presentation is in Power Point, compatible with Mac, and comes in a 15-minute and a 50-minute versions. Our evaluation data shows that this is a highly effective presentation for sharing the facts about the profession and correcting many common misperceptions. <u>https://getthefactsout.org/presentation-faculty</u>
- Faculty Presentation: Teaching: The best kept Secret! https://getthefactsout.org/presentation-faculty
- Find a certification program for prospective teachers <u>https://getthefactsout.org/find-certification-program</u>
- Flyer Template: <u>https://getthefactsout.org/flyer</u>
- Loan forgiveness and retirement faculty handout <u>https://getthefactsout.org/sites/default/files/2019-10/Loans-and-Retirement-9-</u> <u>27-19.pdf</u>
- Posters: Teach Science/Math! Inspire Young Minds. <u>https://getthefactsout.org/poster</u>
- Reaching Students Recruitment strategies and tips <u>https://getthefactsout.org/reach-students</u>
- Salary by major faculty handout https://getthefactsout.org/sites/default/files/2019-10/Salary-by-Major092719.pdf
- Satisfaction faculty handout https://getthefactsout.org/sites/default/files/2019-10/Teachers-rate-9-27-19.pdf
- Satisfaction, loan forgiveness, and retirement Handout for students and parents <u>https://getthefactsout.org/sites/default/files/2019-</u> <u>10/Satisfaction-Loans-Retirement%209-27-19.pdf</u>
- Share your passion with your students Recruitment strategies and tips https://getthefactsout.org/share-your-passion-your-students

- Student Brochures: Thinking about Teaching? <u>https://getthefactsout.org/brochure</u>
- Student Presentation: Busting Myths about the teaching profession <u>https://getthefactsout.org/presentation-students</u>
- Teacher Salaries handout for students and parents <u>https://getthefactsout.org/sites/default/files/2019-10/Teacher-Salaries-Denver-</u> %209-27-19.pdf
- Teacher salaries faculty handout <u>https://getthefactsout.org/sites/default/files/2019-10/TeacherSalaries-National%209-27-19.pdf</u>
- Tested messaging Recruitment strategies and tips <u>https://getthefactsout.org/tested-messaging</u>

Survey Instruments

- PTaP with SSE: <u>https://www.surveymonkey.com/r/PTaP_AY19-20</u>
- PTaP.HE with FSI: <u>https://www.surveymonkey.com/r/PTaPHE_AY19-20</u>

Other Publications

- Stephanie Ryan (2020). Career Profiles: A Tale of Two High School Teachers. inChemistry; <u>https://inchemistry.acs.org/content/inchemistry/en/careers/high-school-teacher-career-track.html.</u> Status = PUBLISHED; Acknowledgement of Federal Support = Yes
- Erica Jacobsen (2019). *Especially JCE*. ChemED XChange; <u>https://www.chemedx.org/article/especially-jce-july-2019</u>. Status = PUBLISHED; Acknowledgement of Federal Support = Yes
- Jennifer Nielson (2019). Getting the facts out about teaching chemistry as a career. Chemical & Engineering News; <u>https://cen.acs.org/acs-news/comment/Getting-facts-teaching-chemistry-career/97/i44</u>. Status = PUBLISHED; Acknowledgement of Federal Support = Yes
- Terri M. Chambers, Etta C. Gravely, William Hunter, Jennifer B. Nielson, and Ellen J. Yezierski (2019). *Refuting Myths about Secondary Chemistry Teaching: Getting the Facts Out to Current and Future Educators*. Journal of Chemical Education; DOI: 10.1021/acs.jchemed.9b00547. Status = PUBLISHED; Acknowledgement of Federal Support = Yes

Patent Applications

Technologies or Techniques

Thesis/Dissertations

Websites or Other Internet Sites

Get the Facts Out: https://getthefactsout.org/

This site is designed for a few audiences. 1. Teacher Recruiters; 2. Prospective teachers; 3. General public researching the teaching profession.

1. Teacher recruiters will find the latest versions of the GFO Toolkit resources here

2. Prospective teachers can explore facts about the profession as well as find a certification program in our certification data base which links to a full listing of certification programs in each U.S. state.

3. If a person is interested in checking facts about the teaching profession, the site houses a range of facts with links to data to support these.

Get the Facts Out; Dispel Myths About Teaching STEM: <u>https://getthefactsout.org/</u>

Participants/Organizations

What individuals have worked on the project?

Adams, Wendy	PD/PI	8
Ensley, Douglas	Co PD/PI	0
Plisch, Monica	Co PD/PI	0
Taylor, Terri	Co PD/PI	0
Levy, Rachel	Co-Investigator	0

Adams, Wendy	PD/PI	8
Gravely, Etta	Faculty	0
Hendrix, Tim	Faculty	0
Hunter, William	Faculty	0
Kuo, Vince	Faculty	0
Magee-Sauer, Karen	Faculty	0
Merrell, Duane	Faculty	0
Nielson, Jennifer	Faculty	0
Stewert, Gay	Faculty	0
Yezierski, Ellen	Faculty	0
Zbiek, Rose Mary	Faculty	0
Breakall, Jared	Postdoctoral (scholar, fellow or other postdoctoral position)	5
Logan, Savannah	Postdoctoral (scholar, fellow or other postdoctoral position)	9
Pearson III, Richard	Postdoctoral (scholar, fellow or other postdoctoral position)	0
Costley, Allie	Other Professional	4
Grimes, Jessica	Other Professional	0
May, David	Other Professional	2
Roti Roti, Annelise	Other Professional	1
Thompson, Kenetia	Other Professional	0
Bolda, Leslie	Undergraduate Student	1
Lang, Dawson	Undergraduate Student	0
Chasteen, Stephanie	Consultant	1
Dearing, Jim	Consultant	0
Ferguson, Mark	Consultant	0
Levine, Zach	Consultant	0
McKagan, Sarah	Consultant	0
Ryan, Stephanie	Consultant	1

Full details of individuals who have worked on the project:

Wendy K AdamsEmail: wkadams@mines.eduMost Senior Project Role: PD/PINearest Person Month Worked: 8Contribution to the Project: PI Adams directs the Research Team, The Toolkit/Resource team and the Website development. Adams mentors three research
associates/postdocs, conducts most of the development and testing of the resources and conducts a large part of the project outreach.Funding Support: The Colorado School of Mines Noyce Scholarship Grant Award #1557254 supports 8% of Adams time, much of which is spent on sharing facts
about the profession at Mines.International Collaboration: No
International Travel: No

Douglas Ensley

Email: deensley@ship.edu
Most Senior Project Role: Co PD/PI
Nearest Person Month Worked: 0
Contribution to the Project: Ensley has not been active on the project since stepping down from the MAA central office other than to advise Adams on opportunities to reach out to other potential math partners once MAA decided to no longer engage.
Funding Support: None
International Collaboration: No

Monica J Plisch

International Travel: No

Email: plisch@aps.org Most Senior Project Role: Co PD/PI Nearest Person Month Worked: 0 Contribution to the Project: Lead APS activities, Lead Societies Working Group, Strategic Planning Funding Support: None International Collaboration: No International Travel: No

Terri M Taylor

Email: t_taylor@acs.org Most Senior Project Role: Co PD/PI Nearest Person Month Worked: 0 Contribution to the Project: Leads the GFO efforts for ACS. Coordinates change agent activities and writes articles to share the project with the society as a whole. Funding Support: Taylor's GFO work is part of her position with ACS and is funded fully by ACS International Collaboration: No

International Travel: No

Rachel Levy

Email: levy@maa.org Most Senior Project Role: Co-Investigator Nearest Person Month Worked: 0 Contribution to the Project: MAA project management. Levy attended the Annual meeting in Golden Funding Support: none International Collaboration: No International Travel: No

Etta Gravely

Email: gravely@ncat.edu Most Senior Project Role: Faculty Nearest Person Month Worked: 0 Contribution to the Project: Chemistry change agent. Implemented strategies and materials in the Get the Facts Out toolkit and provide feedback to the development team. Advised implementation of GFO at ACS. Participated in videoconferences with other National Chemistry Change Agents and ACS staff. Funding Support: none International Collaboration: No International Travel: No

Tim Hendrix

Email: hendrixt@meredith.edu Most Senior Project Role: Faculty Nearest Person Month Worked: 0 Contribution to the Project: Math change agent and past Executive Director of AMTE. Tim worked as a change agent sharing GFO materials nationally and coauthoring an article for the MAA focus. Tim also was instrumental in our efforts to build our new partnership with AMTE. Funding Support: none International Collaboration: No International Travel: No

William Hunter
Email: wjhunte@ilstu.edu
Most Senior Project Role: Faculty
Most Senior Project Role: Faculty
Nearest Person Month Worked: 0
Contribution to the Project: Chemistry change agent. Implemented strategies and materials in the Get the Facts Out toolkit and provide feedback to the development team. Advised implementation of GFO at ACS. Participated in videoconferences with other National Chemistry Change Agents and ACS staff.
Funding Support: none
International Collaboration: No
International Travel: No

Vince Kuo

Email: hkuo@mines.edu Most Senior Project Role: Faculty Nearest Person Month Worked: 0 Contribution to the Project: Physics Change Agent. Attended the KickOff in Golden, has conducted a very active local campaign and presented at AAPT.. Funding Support: none International Collaboration: No International Travel: No

Karen Magee-Sauer

Email: sauer@rowan.edu Most Senior Project Role: Faculty Nearest Person Month Worked: 0 Contribution to the Project: Physics Change Agent but transitioning away from GFO as permanent Dean of her college. Magee-Sauer still shares the facts locally and provided feedback on the new website design. Funding Support: none International Collaboration: No

International Travel: No

Duane Merrell

Email: duane_merrell@byu.edu Most Senior Project Role: Faculty Nearest Person Month Worked: 0 Contribution to the Project: Physics Change Agent. Engaging in a very active local campaign at Brigham Young University. Presented at national AAPT meetings Also active member of the National Advisory Board and attended the annual meeting. Funding Support: none

International Collaboration: No International Travel: No

Jennifer Nielson

Email: jnielson@chem.byu.edu Most Senior Project Role: Faculty

Nearest Person Month Worked: 0

Contribution to the Project: Chemistry change agent. Implemented strategies and materials in the Get the Facts Out toolkit and provided feedback to the development team. Advised implementation of GFO at ACS. Participated in videoconferences with other National Chemistry Change Agents and ACS staff. Authored article in the Journal of Chemical Education. Participated in the Mines GFO Site visit and conducted virtual workshops

Funding Support: none International Collaboration: No International Travel: No

Gay Stewert

Email: gbstewart@mail.wvu.edu Most Senior Project Role: Faculty Nearest Person Month Worked: 0 Contribution to the Project: Physics Change Agent. Conducted active local campaign and presented nationally at UTeach and AAPT meetings. Consulted in the Evaluation Working group all year and now is working with the planning team. Reviewed annual report. Funding Support: none International Collaboration: No International Travel: No

Ellen Yezierski

Email: yeziere@miamioh.edu Most Senior Project Role: Faculty Nearest Person Month Worked: 0

Contribution to the Project: Chemistry change agent. Implemented strategies and materials in the Get the Facts Out toolkit and provide feedback to the development team. Advised implementation of GFO at ACS. Participated in videoconferences with other National Chemistry Change Agents and ACS staff. Co-authored article in the Journal of Chemical Education and presented virtual workshops. Transitioning into the change agent representative on the evaluation working group.

Funding Support: none International Collaboration: No International Travel: No

Rose Mary Zbiek Email: rmz101@psu.edu Most Senior Project Role: Faculty Nearest Person Month Worked: 0 Contribution to the Project: Math change agent through Summer 2019.

Jared Breakall

Email: jbreakall@mines.edu

Most Senior Project Role: Postdoctoral (scholar, fellow or other postdoctoral position)

Nearest Person Month Worked: 5

Contribution to the Project: Breakall has focused on quantitative analysis of the PTaP.HE and the PTaP instruments. Developed the quantitative site report format, updated the scoring sheets and analyzed the results by various demographics. Attended weekly research meetings, conducted the BYU site visit with Adams, supervised an undergraduate who completed all of the quantitative site reports. His PD has focused on various statistical analysis techniques **Funding Support:** 5 months on 100Kin10 Foundation funds and 1 month on Teach@Mines. Both support his GFO time **International Collaboration:** No

International Travel: No

Savannah Logan

Email: sllogan@mines.edu

Most Senior Project Role: Postdoctoral (scholar, fellow or other postdoctoral position)

Nearest Person Month Worked: 9

Contribution to the Project: Conducted the Mines and CSU Long Beach site visits. Conducted the PTaP and PTaP.HE data pushes both fall and spring. Presented at National AAPT meetings and PhysTEC. Attended the annual meeting and advisory board meetings as well as all change agent meetings. Supervised an undergraduate this summer who helped with the data push. Wrote a PERC paper both summers. Helped with the website redesign. Conducted messaging focus groups

Funding Support: 2.75 months Colorado School of Mines Robert Noyce Scholarship Grant Award #1557254 and 1.8 months Teach@Mines. Both support some of Logan's GFO efforts

International Collaboration: No

International Travel: No

Richard Pearson III

Email: rlpearson@mines.edu

Most Senior Project Role: Postdoctoral (scholar, fellow or other postdoctoral position)

Nearest Person Month Worked: 0

Contribution to the Project: Acquired a faculty position summer 2019. Year 1: Worked with Adams to develop and collect evidence of validity for the Faculty Perceptions of Teaching as a Profession instrument, attended the GFO Kick Off, assist with research project management, assisted with hand out design and layout, led the quantitative site data collecting Spring 2019, and conducted data mining throughout the year.

Funding Support: None International Collaboration: No

International Travel: No

Allie Costley Email: amcostley@mines.edu Most Senior Project Role: Other Professional Nearest Person Month Worked: 4 Contribution to the Project: Provides administrative support for the project including management of sub awards, hiring of personnel on the Mines side, coordination of events, provide research support including the majority of the teacher salary data mining, assistance with focus groups and data analysis, assist PI where needed. Funding Support: 2 months Teach@Mines. Some Teach@Mines work is for GFO International Collaboration: No

International Travel: No

Jessica Grimes

Email: j_grimes@acs.org Most Senior Project Role: Other Professional Nearest Person Month Worked: 0 Contribution to the Project: ACS support staff Funding Support: none International Collaboration: No International Travel: No

David May

Email: may@aps.org Most Senior Project Role: Other Professional Nearest Person Month Worked: 2 Contribution to the Project: Manage APS project activities including physics change agent activities, physics marketing campaign, GFO website development, and support working group meetings Funding Support: none

International Collaboration: No International Travel: No

Annelise Roti Roti Email: rotiroti@aps.org Most Senior Project Role: Other Professional Nearest Person Month Worked: 1 Contribution to the Project: Maintain physics department contacts and communications Funding Support: none International Collaboration: No International Travel: No

Kenetia Thompson

Email: K_Thompson2@acs.org Most Senior Project Role: Other Professional Nearest Person Month Worked: 0 Contribution to the Project: Support staff for ACS Funding Support: none International Collaboration: No International Travel: No

Leslie Bolda

Email: Ibolda@mines.edu Most Senior Project Role: Undergraduate Student Nearest Person Month Worked: 1 Contribution to the Project: Undergraduate research assistant. Leslie analyzed the PTaP and PTaP.HE data from year 1 by site and put together each site's customized report. She also analyzed the first year of the Faculty Strategy Implementation Survey. Funding Support: none International Collaboration: No International Travel: No

Dawson Lang

Email: dawsontlang@mymail.mines.edu Most Senior Project Role: Undergraduate Student Nearest Person Month Worked: 0 Contribution to the Project: Mine local teacher salary data Funding Support: none International Collaboration: No International Travel: No

Stephanie Chasteen

Email: stephanie@chasteenconsulting.com Most Senior Project Role: Consultant Nearest Person Month Worked: 1 Contribution to the Project: External Evaluator Funding Support: none International Collaboration: No International Travel: No

Jim Dearing

Email: dearjim@msu.edu Most Senior Project Role: Consultant Nearest Person Month Worked: 0 Contribution to the Project: Attended annual meeting in Golden, CO and served on the National Advisory Board Funding Support: none International Collaboration: No International Travel: No

Mark Ferguson Email: mark@bluesteelrealestate.com Most Senior Project Role: Consultant Nearest Person Month Worked: 0 Contribution to the Project: Work with Toolkit team to develop emotionally compelling messaging for the toolkit resources. Assisted with the design of the new website. Attended the annual meeting in Golden, CO and served on the National Advisory Board Funding Support: none International Collaboration: No International Travel: No

Zach Levine

Email: zlevine@teach.org Most Senior Project Role: Consultant Nearest Person Month Worked: 0 Contribution to the Project: Attended the annual meeting in Golden, CO and served on the National Advisory Board Funding Support: none International Collaboration: No International Travel: No

Sarah McKagan

Email: sam.mckagan@gmail.org Most Senior Project Role: Consultant Nearest Person Month Worked: 0 Contribution to the Project: Assisted with website redesign, attended the annual meeting in Golden, CO, served on the National Advisory Board, and provided feedback on the PTaP.HE naming and data visualization Funding Support: none International Collaboration: No International Travel: No

 Stephanie Ryan

 Email: sryan@ryaneducationconsulting.com

 Most Senior Project Role: Consultant

 Nearest Person Month Worked: 1

 Contribution to the Project: ACS Project coordinator beginning 6/15/19. Chemistry-specific research. Participation in Chemistry Change Agent Meetings.

 Consultation on marketing/dissemination opportunities

 Funding Support: none

 International Collaboration: No

 International Travel: No

What other organizations have been involved as partners?

American Chemical Society	Other Nonprofits	Washington, DC
American Physical Society	Other Nonprofits	College Park, MD
California State University - Fullerton	Academic Institution	Fullerton, CA
California State University - Northridge	Academic Institution	Northridge, CA
California State University San Bernardino	Academic Institution	San Bernardino, CA
California State University, Fresno	Academic Institution	Fresno, CA
California State University, Long Beach	Academic Institution	Long Beach, CA
California State University, Monterey Bay	Academic Institution	Monterey Bay, CA
Chicago State University	Academic Institution	Chicago, IL
Cleveland State University	Academic Institution	Cleveland, OH
Colgate University	Academic Institution	Hamilton, NY
Colorado School of Mines	Academic Institution	Golden, CO
Andrews University	Academic Institution	Berrien Springs, MI
Colorado State University	Academic Institution	Fort Collins, CO
Eastern Michigan University	Academic Institution	Ypsilanti, MI
Florida State University	Academic Institution	Tallahassee, FL
Gettysburg College	Academic Institution	Gettysburg, PA
Hofstra University	Academic Institution	Hempstead, NY
Idaho State University	Academic Institution	Pocatello, ID

Illinois Wesleyan University	Academic Institution	Bloomington, IL
James Madison University	Academic Institution	Harrisonburg, VA
Kennesaw State University	Academic Institution	Kennesaw, GA
Lewis University	Academic Institution	Romeoville, IL
Appalachian State University	Academic Institution	Boone, NC
Mathematical Association of America	Other Nonprofits	Washington, DC
Middle Tennessee State University	Academic Institution	Murfreesboro, TN
Missouri University of Science and Technology	Academic Institution	Rolla, MO
Morehead State University	Academic Institution	Morehead, KY
Northern Arizona University	Academic Institution	Flagstaff, AZ
Northwest Missouri State University	Academic Institution	Maryville, MO
Northwestern State University	Academic Institution	Natchitoches, LA
Prince George's Community College	Academic Institution	Largo, MD
Roosevelt University	Academic Institution	Chicago, IL
Rowan University	Academic Institution	Glassboro, NJ
Augustana University	Academic Institution	Sioux Falls, SD
St. Mary's College of Maryland	Academic Institution	St. Mary's City, MD
Texas A&M University - Commerce	Academic Institution	Commerce, TX
University of California - Irvine	Academic Institution	Irvine, CA
University of Central Florida	Academic Institution	Orlando, Florida
University of Colorado - Boulder	Academic Institution	Boulder, CO
University of Houston	Academic Institution	Houston, TX
University of Kansas	Academic Institution	Lawrence, KS
University of Mississippi	Academic Institution	Oxford, MS
University of North Georgia	Academic Institution	Dahlonega, GA
University of Tennessee - Martin	Academic Institution	Martin, TN
Boston University	Academic Institution	Boston, MA
University of Texas - Rio Grande Valley	Academic Institution	Edinburg, TX
University of Texas at Austin	Academic Institution	Austin, TX
University of Washington Bothell	Academic Institution	Bothell, WA
University of Wisconsin - La Crosse	Academic Institution	La Crosse, WI
Wartburg College	Academic Institution	Denver, CO
Waynesburg University	Academic Institution	Waynesburg, PA
West Virginia University	Academic Institution	Morgantown, WV
Westmont College	Academic Institution	Santa Barbara, CA

Worcester Polytechnic Institute	Academic Institution	Worcester, MA
Wright State University	Academic Institution	Dayton, OH
Bridgewater State University	Academic Institution	Bridgewater, MA
Bringham Young University	Academic Institution	Provo, UT
Bringham Young University - Idaho	Academic Institution	Rexburg, ID
California Polytechnic State University - San Luis Obispo	Academic Institution	San Luis Obispo, CA

Full details of organizations that have been involved as partners:

American Chemical Society Organization Type: Other Nonprofits Organization Location: Washington, DC Partner's Contribution to the Project: Facilities **Collaborative Research** More Detail on Partner and Contribution: Identified chemistry change agents, recruited quantitative sties, disseminated GFO resources through ACS channels. American Physical Society Organization Type: Other Nonprofits Organization Location: College Park, MD Partner's Contribution to the Project: Facilities **Collaborative Research** More Detail on Partner and Contribution: Identified physics change agents, developed the website, recruited quantitative sties, disseminated GFO resources through APS and PhysTEC channels, participated in overall project planning. Andrews University Organization Type: Academic Institution Organization Location: Berrien Springs, MI Partner's Contribution to the Project: Collaborative Research More Detail on Partner and Contribution: This institution is a GFO Quantitative Site. The Research Team collects perceptions survey data from the physics faculty and students each year. **Appalachian State University** Organization Type: Academic Institution Organization Location: Boone, NC Partner's Contribution to the Project: **Collaborative Research** More Detail on Partner and Contribution: This institution is a GFO Quantitative Site. The Research Team collects perceptions survey data from the math and chemistry faculty and students each year. **Augustana University** Organization Type: Academic Institution Organization Location: Sioux Falls, SD Partner's Contribution to the Project: **Collaborative Research** More Detail on Partner and Contribution: This institution is a GFO Quantitative Site. The Research Team collects perceptions survey data from the physics faculty and students each year. **Boston University** Organization Type: Academic Institution Organization Location: Boston, MA Partner's Contribution to the Project: Collaborative Research More Detail on Partner and Contribution: This institution is a GFO Quantitative Site. The Research Team collects perceptions survey data from the physics faculty and students each year. Bridgewater State University

Organization Type: Academic Institution Organization Location: Bridgewater, MA

Partner's Contribution to the Project: Collaborative Research More Detail on Partner and Contribution: This institution is a GFO Quantitative Site. The Research Team collects perceptions survey data from the physics faculty and students each year.
Bringham Young University Organization Type: Academic Institution Organization Location: Provo, UT Partner's Contribution to the Project: Facilities Collaborative Research More Detail on Partner and Contribution: This institution is a GFO Qualitative Site. Researchers visit this IHE once per year during the grant period to conduct focus groups and give a workshop on the GFO resources. Additionally, once per year the GFO Research Team collects perceptions survey data from faculty and students in physics, chemistry and math.
Bringham Young University - Idaho Organization Type: Academic Institution Organization Location: Rexburg, ID Partner's Contribution to the Project: Collaborative Research More Detail on Partner and Contribution: This institution is a GFO Quantitative Site. The Research Team collects perceptions survey data from the physics faculty and students each year.
California Polytechnic State University - San Luis Obispo Organization Type: Academic Institution Organization Location: San Luis Obispo, CA Partner's Contribution to the Project: Collaborative Research More Detail on Partner and Contribution: This institution is a GFO Quantitative Site. The Research Team collects perceptions survey data from the physics, math and chemistry faculty and students each year.
California State University - Fullerton Organization Type: Academic Institution Organization Location: Fullerton, CA Partner's Contribution to the Project: Collaborative Research More Detail on Partner and Contribution: This institution is a GFO Quantitative Site. The Research Team collects perceptions survey data from the chemistry faculty and students each year.
California State University - Northridge Organization Type: Academic Institution Organization Location: Northridge, CA Partner's Contribution to the Project: Collaborative Research More Detail on Partner and Contribution: This institution is a GFO Quantitative Site. The Research Team collects perceptions survey data from the physics faculty and students each year.
California State University San Bernardino Organization Type: Academic Institution Organization Location: San Bernardino, CA Partner's Contribution to the Project: Collaborative Research More Detail on Partner and Contribution: This institution is a GFO Quantitative Site. The Research Team collects perceptions survey data from the physics faculty and students each year.
California State University, Fresno Organization Type: Academic Institution Organization Location: Fresno, CA Partner's Contribution to the Project: Collaborative Research More Detail on Partner and Contribution: This institution is a GFO Quantitative Site. The Research Team collects perceptions survey data from the physics faculty and students each year.
California State University, Long Beach Organization Type: Academic Institution

Organization Type: Academic Institutio Organization Location: Long Beach, CA

Partner's Contribution to the Project:

Collaborative Research

More Detail on Partner and Contribution: This institution is a GFO Qualitative Site. Researchers visit this IHE once per year during the grant period to conduct focus groups and give a workshop on the GFO resources. Additionally, once per year the GFO Research Team collects perceptions survey data from faculty and students in physics, chemistry and math.

California State University, Monterey Bay Organization Type: Academic Institution Organization Location: Monterey Bay, CA Partner's Contribution to the Project: **Collaborative Research** More Detail on Partner and Contribution: This institution is a GFO Quantitative Site. The Research Team collects perceptions survey data from the math and chemistry faculty and students each year. **Chicago State University** Organization Type: Academic Institution Organization Location: Chicago, IL Partner's Contribution to the Project: Facilities **Collaborative Research** More Detail on Partner and Contribution: This institution is a GFO Qualitative Site. Researchers visit this IHE once per year during the grant period to conduct focus groups and give a workshop on the GFO resources. Additionally, once per year the GFO Research Team collects perceptions survey data from faculty and students in physics, chemistry and math. **Cleveland State University** Organization Type: Academic Institution Organization Location: Cleveland, OH Partner's Contribution to the Project: **Financial support** Collaborative Research More Detail on Partner and Contribution: This institution is a GFO Quantitative Site. The Research Team collects perceptions survey data from the physics, math and chemistry faculty and students each year. **Colgate University** Organization Type: Academic Institution Organization Location: Hamilton, NY Partner's Contribution to the Project: **Collaborative Research** More Detail on Partner and Contribution: This institution is a GFO Quantitative Site. The Research Team collects perceptions survey data from the physics faculty and students each year. **Colorado School of Mines** Organization Type: Academic Institution Organization Location: Golden, CO Partner's Contribution to the Project: Facilities **Collaborative Research** More Detail on Partner and Contribution: This institution is a GFO Qualitative Site. Researchers visit this IHE once per year during the grant period to conduct focus groups and give a workshop on the GFO resources. Additionally, once per year the GFO Research Team collects perceptions survey data from faculty and students in physics, chemistry and math. **Colorado State University** Organization Type: Academic Institution Organization Location: Fort Collins, CO Partner's Contribution to the Project: Collaborative Research More Detail on Partner and Contribution: This institution is a GFO Quantitative Site. The Research Team collects perceptions survey data from the math faculty and students each year. Eastern Michigan University Organization Type: Academic Institution Organization Location: Ypsilanti, MI Partner's Contribution to the Project: **Collaborative Research** More Detail on Partner and Contribution: This institution is a GFO Quantitative Site. The Research Team collects perceptions survey data from the chemistry faculty and students each year.

Florida State University Organization Type: Academic Institution Organization Location: Tallahassee, FL Partner's Contribution to the Project: Collaborative Research More Detail on Partner and Contribution: This institution is a GFO Quantitative Site. The Research Team collects perceptions survey data from the physics faculty and students each year.
Gettysburg College Organization Type: Academic Institution Organization Location: Gettysburg, PA Partner's Contribution to the Project: Collaborative Research More Detail on Partner and Contribution: This institution is a GFO Quantitative Site. The Research Team collects perceptions survey data from the physics faculty and students each year.
Hofstra University Organization Type: Academic Institution Organization Location: Hempstead, NY Partner's Contribution to the Project: Collaborative Research More Detail on Partner and Contribution: This institution is a GFO Quantitative Site. The Research Team collects perceptions survey data from the physics faculty and students each year.
Idaho State University Organization Type: Academic Institution Organization Location: Pocatello, ID Partner's Contribution to the Project: Collaborative Research More Detail on Partner and Contribution: This institution is a GFO Quantitative Site. The Research Team collects perceptions survey data from the chemistry faculty and students each year.
Illinois Wesleyan University Organization Type: Academic Institution Organization Location: Bloomington, IL Partner's Contribution to the Project: Collaborative Research More Detail on Partner and Contribution: This institution is a GFO Quantitative Site. The Research Team collects perceptions survey data from the physics, math and chemistry faculty and students each year.
James Madison University Organization Type: Academic Institution Organization Location: Harrisonburg, VA Partner's Contribution to the Project: Collaborative Research More Detail on Partner and Contribution: This institution is a GFO Quantitative Site. The Research Team collects perceptions survey data from the chemistry faculty and students each year.
Kennesaw State University Organization Type: Academic Institution Organization Location: Kennesaw, GA Partner's Contribution to the Project: Collaborative Research More Detail on Partner and Contribution: This institution is a GFO Quantitative Site. The Research Team collects perceptions survey data from the chemistry faculty and students each year.
Lewis University Organization Type: Academic Institution Organization Location: Romeoville, IL Partner's Contribution to the Project: Collaborative Research More Detail on Partner and Contribution: This institution is a GFO Quantitative Site. The Research Team collects perceptions survey data from the physics faculty and students each year.
Mathematical Association of America Organization Type: Other Nonprofits Organization Location: Washington, DC

Partner's Contribution to the Project: Facilities Collaborative Research More Detail on Partner and Contribution: MAA distributed GFO at summer 2019 events.
Middle Tennessee State University Organization Type: Academic Institution Organization Location: Murfreesboro, TN Partner's Contribution to the Project: Collaborative Research More Detail on Partner and Contribution: This institution is a GFO Quantitative Site. The Research Team collects perceptions survey data from the physics, math and chemistry faculty and students each year.
Missouri University of Science and Technology Organization Type: Academic Institution Organization Location: Rolla, MO Partner's Contribution to the Project: Collaborative Research More Detail on Partner and Contribution: This institution is a GFO Quantitative Site. The Research Team collects perceptions survey data from the physics faculty and students each year.
Morehead State University Organization Type: Academic Institution Organization Location: Morehead, KY Partner's Contribution to the Project: Collaborative Research More Detail on Partner and Contribution: This institution is a GFO Quantitative Site. The Research Team collects perceptions survey data from the physics and math faculty and students each year.
Northern Arizona University Organization Type: Academic Institution Organization Location: Flagstaff, AZ Partner's Contribution to the Project: Collaborative Research More Detail on Partner and Contribution: This institution is a GFO Quantitative Site. The Research Team collects perceptions survey data from the physics faculty and students each year.
Northwest Missouri State University Organization Type: Academic Institution Organization Location: Maryville, MO Partner's Contribution to the Project: Collaborative Research More Detail on Partner and Contribution: This institution is a GFO Quantitative Site. The Research Team collects perceptions survey data from the physics faculty and students each year.
Northwestern State University Organization Type: Academic Institution Organization Location: Natchitoches, LA Partner's Contribution to the Project: Collaborative Research More Detail on Partner and Contribution: This institution is a GFO Quantitative Site. The Research Team collects perceptions survey data from the math faculty and students each year.
Prince George's Community College Organization Type: Academic Institution Organization Location: Largo, MD Partner's Contribution to the Project: Collaborative Research More Detail on Partner and Contribution: This institution is a GFO Quantitative Site. The Research Team collects perceptions survey data from the chemistry faculty and students each year.
Roosevelt University Organization Type: Academic Institution Organization Location: Chicago, IL Partner's Contribution to the Project: Collaborative Research

More Detail on Partner and Contribution: This institution is a GFO Quantitative Site. The Research Team collects perceptions survey data from the math faculty and students each year.

Rowan University Organization Type: Academic Institution Organization Location: Glassboro, NJ Partner's Contribution to the Project: Collaborative Research More Detail on Partner and Contribution: This institution is a GFO Quantitative Site. The Research Team collects perceptions survey data from the physics, math and chemistry faculty and students each year. St. Mary's College of Maryland Organization Type: Academic Institution Organization Location: St. Mary's City, MD Partner's Contribution to the Project: **Collaborative Research** More Detail on Partner and Contribution: This institution is a GFO Quantitative Site. The Research Team collects perceptions survey data from the physics faculty and students each year. **Texas A&M University - Commerce** Organization Type: Academic Institution Organization Location: Commerce, TX Partner's Contribution to the Project: Collaborative Research More Detail on Partner and Contribution: This institution is a GFO Quantitative Site. The Research Team collects perceptions survey data from the physics faculty and students each year. University of California - Irvine Organization Type: Academic Institution Organization Location: Irvine, CA Partner's Contribution to the Project: **Collaborative Research** More Detail on Partner and Contribution: This institution is a GFO Quantitative Site. The Research Team collects perceptions survey data from the faculty and students each year. **University of Central Florida** Organization Type: Academic Institution Organization Location: Orlando, Florida Partner's Contribution to the Project: **Collaborative Research** More Detail on Partner and Contribution: This institution is a GFO Quantitative Site. The Research Team collects perceptions survey data from the physics faculty and students each year. **University of Colorado - Boulder** Organization Type: Academic Institution Organization Location: Boulder, CO Partner's Contribution to the Project: **Collaborative Research** More Detail on Partner and Contribution: This institution is a GFO Quantitative Site. The Research Team collects perceptions survey data from the physics faculty and students each year. University of Houston Organization Type: Academic Institution Organization Location: Houston, TX Partner's Contribution to the Project: **Collaborative Research** More Detail on Partner and Contribution: This institution is a GFO Quantitative Site. The Research Team collects perceptions survey data from the physics and math faculty and students each year. **University of Kansas** Organization Type: Academic Institution Organization Location: Lawrence, KS Partner's Contribution to the Project: **Collaborative Research** More Detail on Partner and Contribution: This institution is a GFO Quantitative Site. The Research Team collects perceptions survey data from the physics faculty and students each year.

University of Mississippi Organization Type: Academic Institution Organization Location: Oxford, MS Partner's Contribution to the Project: Collaborative Research More Detail on Partner and Contribution: This institution is a GFO Quantitative Site. The Research Team collects perceptions survey data from the physics and chemistry faculty and students each year.
University of North Georgia Organization Type: Academic Institution Organization Location: Dahlonega, GA Partner's Contribution to the Project: Collaborative Research More Detail on Partner and Contribution: This institution is a GFO Quantitative Site. The Research Team collects perceptions survey data from the physics faculty and students each year.
University of Tennessee - Martin Organization Type: Academic Institution Organization Location: Martin, TN Partner's Contribution to the Project: Collaborative Research More Detail on Partner and Contribution: This institution is a GFO Quantitative Site. The Research Team collects perceptions survey data from the math faculty and students each year.
University of Texas - Rio Grande Valley Organization Type: Academic Institution Organization Location: Edinburg, TX Partner's Contribution to the Project: Collaborative Research More Detail on Partner and Contribution: This institution is a GFO Quantitative Site. The Research Team collects perceptions survey data from the physics faculty and students each year.
University of Texas at Austin Organization Type: Academic Institution Organization Location: Austin, TX Partner's Contribution to the Project: Collaborative Research More Detail on Partner and Contribution: This institution is a GFO Quantitative Site. The Research Team collects perceptions survey data from the physics faculty and students each year.
University of Washington Bothell Organization Type: Academic Institution Organization Location: Bothell, WA Partner's Contribution to the Project: Collaborative Research More Detail on Partner and Contribution: This institution is a GFO Quantitative Site. The Research Team collects perceptions survey data from the physics faculty and students each year.
University of Wisconsin - La Crosse Organization Type: Academic Institution Organization Location: La Crosse, WI Partner's Contribution to the Project: Facilities Collaborative Research More Detail on Partner and Contribution: This institution is a GFO Qualitative Site. Researchers visit this IHE once per year during the grant period to conduct focus groups and give a workshop on the GFO resources. Additionally, once per year the GFO Research Team collects perceptions survey data from faculty and students in physics, chemistry and math.
Wartburg College Organization Type: Academic Institution Organization Location: Denver, CO Partner's Contribution to the Project: Collaborative Research More Detail on Partner and Contribution: This institution is a GFO Quantitative Site. The Research Team collects perceptions survey data from the math and chemistry faculty and students each year.
waynesburg University

Organization Type: Academic Institution Organization Location: Waynesburg, PA Partner's Contribution to the Project: Collaborative Research More Detail on Partner and Contribution: This institution is a GFO Quantitative Site. The Research Team collects perceptions survey data from the chemistry faculty and students each year. West Virginia University Organization Type: Academic Institution Organization Location: Morgantown, WV Partner's Contribution to the Project: Facilities **Collaborative Research** More Detail on Partner and Contribution: This institution is a GFO Qualitative Site. Researchers visit this IHE once per year during the grant period to conduct focus groups and give a workshop on the GFO resources. Additionally, once per year the GFO Research Team collects perceptions survey data from faculty and students in physics, chemistry and math. Westmont College Organization Type: Academic Institution Organization Location: Santa Barbara, CA Partner's Contribution to the Project: **Collaborative Research** More Detail on Partner and Contribution: This institution is a GFO Quantitative Site. The Research Team collects perceptions survey data from the chemistry faculty and students each year. Worcester Polytechnic Institute Organization Type: Academic Institution Organization Location: Worcester, MA Partner's Contribution to the Project: Collaborative Research More Detail on Partner and Contribution: This institution is a GFO Quantitative Site. The Research Team collects perceptions survey data from the physics faculty and students each year. Wright State University Organization Type: Academic Institution Organization Location: Dayton, OH Partner's Contribution to the Project: Collaborative Research

More Detail on Partner and Contribution: This institution is a GFO Quantitative Site. The Research Team collects perceptions survey data from the physics faculty and students each year.

What other collaborators or contacts have been involved?

Nothing to report

Impacts

What is the impact on the development of the principal discipline(s) of the project?

This project is supporting chemistry, physics, and mathematics local faculty champions throughout the United States in providing equivalent and fair information about teaching as a profession compared to other STEM careers by providing high-quality accurate recruitment resources.

Longer term this project will recruit more highly qualified teachers into STEM teaching fields which will help improve workforce training and an educated citizenry. Research shows that students coming into college classes will be better prepared for their college STEM courses if they had well prepared STEM teachers.

The project will also produce primary research on STEM student's and faculty's perceptions of grade 7-12 teaching. Some will be first of its kind. This work can be used to guide new research in this needed field of study.

What is the impact on other disciplines?

The GFO resources have been and will continue to be developed and tested with subjects from a range of STEM disciplines. These materials are ready for adoption by other societies or faculty in other STEM disciplines interested in recruiting teachers. Additionally, School of Education folks at the qualitative site visits have indicated that they find the resources effective for any field of teaching.

Additionally, mathematics preparation is the primary barrier to participation in STEM disciplines in college, particularly for underserved students. Increasing the pipeline of highly qualified high school mathematics teachers should have a significant impact on numbers of students successfully pursuing majors and careers in all STEM disciplines.

What is the impact on the development of human resources?

Faculty

- More accurate and complete knowledge of the STEM teaching profession
- More positive opinion of the STEM teaching professions

Postdocs

- Active contributing members of the PER community who are qualified to secure a PER faculty position.
- Stronger project management and research presentation and writing skills.

STEM Teachers

• Increased number of grades 7-12 math, chemistry, and physics teachers.

Incoming college first-year students

Better prepared for introductory STEM courses

What is the impact on physical resources that form infrastructure?

Nothing to report

What is the impact on institutional resources that form infrastructure?

Nothing to report

What is the impact on information resources that form infrastructure?

The Get the Facts Out website is a resource about the teaching profession

It hosts a wealth of information and resources related to chemistry, mathematics, and physics teaching professions. The site includes the information for prospective teachers, GFO resources (presentations for faculty and students, ready-to-print posters/brochures/flyers, etc....), facts and data, motivation and avenues for engagement, and other components.

What is the impact on technology transfer?

Nothing to report

What is the impact on society beyond science and technology?

There is a growing body of research that provides evidence that increasing the number and diversity of qualified STEM teachers could open more doors for socioeconomically disadvantaged students and students from underrepresented groups. Additionally, increasing the number of qualified STEM teachers will improve public knowledge and attitudes about STEM fields.

Changes/Problems

Changes in approach and reason for change

Mathematics Partner

The Mathematics Association of America discontinued their engagement with GFO beginning Fall 2019. PI Adams immediately reached out to leaders in the mathematics community including:

- Doug Ensley (past Executive Director MAA), Michael Dorff (MAA President), Curtis Bennett (2016-2019 Representative of the Congress of MAA and Dean at CSULB), Gus Greivel (math at Mines), and Tim Hendrix (Executive Director of AMTE)
- These resulted in additional connections to Kate Stevenson, Chair AMS committee on education and Karen Saxe (AMS Associate Executive Director Head of Government Relations Division)

AMS, AMTE and MAA society committees all expressed an interest in working with GFO and shared proposals of how this could work. Upon careful consideration of the options AMTE was clearly a natural fit for the project being comprised completely of mathematics teacher educators. Although it is a small organization, the members have active roles in many of the other math societies.

AMTE will begin their GFO efforts in earnest starting Yr3. Their call for change agents resulted in 25 applications. Five change agents were chosen, including a past MAA GFO change agent, who each have national level profiles in mathematics and are geographically distributed across the U.S. AMTE is poised to quickly take on this work and share these resources broadly to mathematics teacher educators.

Toolkit Development

Message development and identification of compelling photo assets is an ongoing effort that will continue, likely through the life of the grant. Additionally, we have found the need for half a dozen short videos to supplement our resources. We hope to develop these in Year 3.

Data Mining

It has become clear that asking faculty to look up local teacher salaries creates an unacceptably large energy barrier. In some cases, faculty champions have looked up their local data and either have misunderstood how to find accurate current data or do not have time after finding

the data to customize the resources and share them. For this reason, we embarked on a data mining exercise to locate a minimum of 2 districts near each of our study sites and look up teacher salaries at several career points as well as average salaries for all workers, average home prices and average rents for a 2 bedroom. In this way, local faculty champions can focus their efforts on customizing the resources and getting the facts out. Additionally, GFO champions can fill out a data mining request form on the website and a GFO team member will look up data for their institution.

Actual or Anticipated problems or delays and actions or plans to resolve them

The GFO efforts to share resources with math departments were undertaken without the benefit of a national society during the majority of Yr2. This has resulted in fewer new local math champions than we were hoping but the Research Team did make special efforts to support math faculty at our study sites so that the project still had some reach in mathematics.

The Research Team had intended to have the PTaP development and validation paper completed this year; however, Richard Pearson III, post-doctoral fellow, was hired into a faculty position at Embry Riddle Aeronautical University - Daytona Beach. He left the project Summer 2019 and we were successful in hiring a new post-doctoral fellow; but, he was not able to begin until January 2020.

Changes that have a significant impact on expenditures

Nothing to report

Significant changes in use or care of human subjects

Colorado School of Mines has approved updates to the GFO human subject's protocol as follows:

- 1. Addition of new co-investigators, Jared Breakall, Mark Hannum, Shari Stockero, and Allison Costley.
- 2. Add the ability to audio record interviews and focus groups with both student and faculty participants.
- 3. Add evaluation interviews to this project.
- 4. *Have the institutions who are providing data for this project, also fill out the* Physics Teacher Education Program Analysis (PTEPA) Rubric *and send us their results.*
- 5. Add the ability to send student names, stripped from the data, of those who have taken the PTaP survey to respective site leaders, for extra credit.

Significant changes in use or care of vertebrate animals

Nothing to report

Significant changes in use or care of biohazards

Nothing to report

Special Requirements

Responses to any special reporting requirements specified in the award terms and conditions, as well as any award specific reporting requirements.