

Changing the conversation around STEM teacher recruitment

### Get the Facts Out 2022 Annual Evaluation Report

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### **About this report**

This is the evaluation report at the end of Year 4 of the Get the Facts Out (GFO) project. For reporting purposes, each year begins June 19 and ends on June 18; thus, Year 4 is June 19, 2021-June 18, 2022. The evaluation has focused on the following guiding question: **Are the project processes and products likely to lead to the successful achievement of the vision?** 

The following evaluation themes and questions address this overarching goal:

1. **Actor capacity**. How well prepared are national change agents and local champions to undertake the work? How effective are the professional development opportunities that prepare these actors? *Focus of Years 1-3.* 

2. Activity evaluation. What kinds of campaigns are developed at national and local levels, how do these differ by discipline, and how faithful are they to the original principles of Get the Facts Out? *Focus of Years 3-5.* 

3. **National outreach.** What is the overall reach, use, and impact of the project? Who uses the materials, and what is the perception of the materials? *Focus of Year 4.* 

**4. Impact evaluation.** What is the impact on the national teacher shortage? Are disciplinary societies prepared to sustain the campaigns? Is the overall Theory of Change supported? How might it be modified for future projects? *Focus of Year 5.* 

Evaluation data and reports in 2022 included:

- 1. What is the awareness of GFO among AMTE respondents? (AMTE society survey report, April '22; N=137)
- Who are the champions and what are they doing? (Champion survey report, Jan. '22; N=105)
- How well is the Change Agent model working? (Casual change agent evaluation, Mar. '22; N=8)
- 4. How well is GFO enacting the recommendations from 2021? (Six month retrospective report, Jan. '22)
- How did the GFO mini conference go? (Mini conference evaluation report, Oct. '21; N=46)
- What are society communication plans for GFO? (Submitted communication plans from societies, Spring '22; N=3)
- 7. What are the change agents and champions doing? (Activity logs from change agents and champions as of April '22)
- What are the results of student and faculty workshops? (Compiled data from SurveyMonkey forms from student and faculty workshops as of April '22; N=1,605 students, 639 faculty)
- How do faculty at GFO study sites use the materials? (Interpreted data from the Faculty Strategy Implementation (FSI) survey appended to the PTaP.HE survey; N=535 faculty respondents, reduced to N=133 at the end of the survey).

### **Executive Summary**

Get the Facts Out is at the end of its 4th year of funded work, and boasts a great many accomplishments for this relatively short period. It has built on the successes of the past several years, expanding contact with the intended audiences, achieving widespread awareness of the project through a variety of dissemination mechanisms, offering highly effective student presentations and faculty workshops, and actively supporting increased engagement of local Champions using the materials. The project has continuously iterated its approach, addressing challenges and responding carefully to all evaluation feedback, discussing results, assigning working groups to write up a response, and circling back to them over time. A 6-month evaluation retrospective in January 2022 assigned the project a "check plus" on their progress in addressing identified difficulties. These strengths were also all identified in the 2021 annual evaluation report, but have continued to grow and improve over the past year. In this Executive Summary I provide an outline of the evaluation findings over the past year; the evidence to support these statements can be found in the full report.

#### I have identified substantial project success this year, including:

#### GFO strengthens local teacher recruitment efforts.

Half of GFO Champions can identify concrete impacts of using GFO, including drawing students to their teaching program, an overall strengthening of the teacher recruitment efforts, and empowering faculty to engage actively in recruiting future teachers. Since many departments do not take responsibility for recruiting future teachers, this empowerment is key.

### Faculty and student workshops are highly effective at conveying knowledge and changing perceptions about teaching as a profession.

One of the highlights of GFO are the tested faculty and student presentations. Averaging across 54 student and 42 faculty workshop surveys (~2,200 individual responses), I find impressive

pre-post gains in knowledge and perceptions of 41% for students and 45% for faculty presentations (normalized gains of 64% and 61% respectively), with an effect size of 1.9 and 2.3 respectively.

GFO presentations reduce barriers to choosing teaching careers.

On student presentation pre/post surveys, students display important shifts in attitudes, agreeing that teaching is a good career and disagreeing that teaching pays a lot less than other careers. One-third of students shift towards agreement (or more accurately, away from disagreement) that they want to be a teacher after attending a GFO presentation.



One-third of students shifted towards



#### Awareness of GFO is high and growing.

On a variety of surveys, including a large survey of members of each engaged GFO society, 40% or more respondents were aware of GFO. Awareness of GFO was particularly high among AMTE members; 56% of those surveyed were aware of GFO, and 16% mentioned GFO as a resource before it was mentioned in the survey. Even those survey respondents who are not aware of GFO indicate that they are likely to at least visit the website (60%) or might use the materials (43%), showing that faculty immediately perceive value in the project and what it offers.

## There are now 202 GFO Champions at 157 institutions, with high growth in Chemistry.

Additionally, the number of activities reported by these Champions have increased from 267 in 2021 to 384 in 2022. The growth in Chemistry is notable and is the result of their focused outreach to the Chemistry community.

#### The project has had an impressive reach, engaging at least 10,000 students and faculty in learning activities, and another 10,000 through outreach.

When counting the reported estimated



reach of all GFO activities by Change Agents, GFO/Mines staff (e.g. W. Adams, D. May, and team), and Champions, approximately 6,500 students and 3,000 faculty have engaged in workshops or presentations, and an additional ~12,000 students and faculty have been touched by broader outreach efforts (e.g. emails, posters, videos, and publications) based on registered activities. I estimate that this reach represents ~ 2,000 STEM departments: This achieves the identified goal of 1,200 STEM departments over the 5 year project. Additionally, on surveys, approximately ¾ of those aware of GFO have attended a workshop, showing that many faculty have engaged in deep learning about GFO. These numbers are only the reported reach and are certainly an under-estimate.



#### **The project uses multiple outreach and support methods to engage the community.** This impact is a testament to the community of practice design of GFO. It is also a direct result of the engagement efforts of the project to date, including a Champion Engagement Strategy working group, society-submitted communication plans, a variety of Change Agent outreach activities, an active Facebook group (268 members), Newsletter list (568 subscribers), regular Newsletters (36% open rate; considered high), Website (60,000 unique pageviews in 9 months and 1621 downloads), Blog (16 posts; drawing in the majority of web visitors), YouTube videos (22 videos, over 2,000 views), Email discussion list (210 subscribers), events (e.g. presentation at national conferences such as UTeach and Noyce, GFO mini conference, AMTE conference, ACS webinars, All Change Agent meetings). Most people learn of GFO through word of mouth, conferences, and email, showing that these outreach mechanisms are effective. The GFO Change Agents are helping in this work: In 2022, Change Agents reported 114 activities, reaching 300 faculty and 400 students.

#### GFO Champions are expanding GFO's reach, especially to student audiences.

In the last year, Champions conducted more student presentations (93) than Change Agents or GFO/Mines staff combined. These Champion presentations have reached ~2,200 students (and ~4,000 since 2019).





Additionally, Fidelity of Implementation scores for GFO Champions' presentations were similar or better than those of Change Agents or GFO/Mines, showing that these presentations emphasize key messages and give time for active engagement and discussion. Champions have also engaged faculty through workshops, though more modestly so (a total of 725 since 2019). While they are not conducting faculty workshops, however, Champions may be spreading GFO through word of mouth: 91% of Champions indicate they have talked to faculty at their institution, and 48% to faculty outside their institution.

#### Faculty are highly positive about GFO, finding it to be a uniquely valuable resource.

Faculty are enthusiastic about GFO and the materials, often citing the customizable materials and access to national and local data. For example, 88% agree that GFO is highly relevant for their recruitment audience, 98% agreed that they feel confident that the data provided by GFO is accurate and trustworthy, and 96% agreed that GFO provides needed resources and supports that they cannot find elsewhere.

• "I have been promoting STEM teaching for 35 years and lacked GOOD resources. I immediately recognized the value of the resources GFO provided, even early on in the program." - GFO Champion

#### Many faculty (including Champions) are using GFO resources.

On surveys, 60% of Newsletter subscribers and 40% of broader FSI survey respondents are using GFO. The most popular materials are the website, student presentation, data handouts, and infographics.

#### The growth areas I have identified include:

#### Traditional STEM faculty are less aware of GFO.

The high awareness and engagement of AMTE is a hallmark of the excellent fit between GFO and this society, which focuses on teacher preparation. More traditional STEM faculty (i.e., those not involved in education or teacher preparation) are less aware of GFO (only 5% of ACS and 8% of APS-only members were aware in surveys).

#### Reach to faculty by Change Agents has room for growth

A key part of the Theory of Change of GFO is that as faculty change their perceptions, they will give students more accurate information about teaching careers. This requires faculty to be exposed to GFO. The number of faculty workshops conducted by GFO has remained steady at about 30 per year, with the load shared between Change Agents and Mines/PIs (offering 14 and 18 workshops respectively). However, given the sheer number of Change Agents (~15 across disciplines) this means that most Change Agents are only conducting one workshop per year on average. Not only is there room for growth in that number, but I have concerns whether Change Agents can be expert presenters given that frequency. Additionally, Change Agents do not offer many student presentations – while students are not a target of Change Agent activities per se, conducting student presentations prepares Change Agents to coach Champions in doing so.





Faculty workshops are one of the least commonly used resources by Champions, and the least downloaded on the web. While Change Agents are indeed broadening the project's reach, I think that a focused effort must be made for these groups to offer more faculty-facing workshops in 2023. I also think that certain Champions may be tapped to offer regional faculty workshops. Since most Champions are reluctant to give faculty workshops, but most are talking informally to faculty, Champions may benefit from help in engaging more productively with faculty informally (e.g., using data handouts and a conversations guide).

**STEM faculty seek information on K12 careers from resources which are not targets of GFO, but could be.** This represents a potential growth area. In particular, faculty seek information about K12 teaching careers within schools of education, academic advisors, teacher preparation programs, related professional organizations (such as NCTM for mathematics), and state departments of education.

#### Many Champions are not yet active.

About half have done at least one activity, and only 22% have done a student presentation. Given the reach accomplished through the currently active Champions, imagine the explosive reach if more Champions were active? Chemistry Champions in particular are not yet active, since many are new. However, a significant challenge is time. Engaging those who do have significant time for recruitment and career advising (e.g., advisors, those running teacher preparation programs) may assist with this, but time will always be a challenge.

#### Time, knowledge, and opportunity are the biggest barriers to using GFO.

Among both GFO users and non-users, "time" is an often-cited barrier to using the materials. Another is that they don't feel knowledgeable enough about teacher preparation, or that they don't have an opportunity to use the materials. Thus, creating such opportunities, or revealing where faculty could incorporate GFO into their existing work, could be valuable. I note that most materials are used in structured venues (classrooms, student clubs, faculty meetings, and advisor meetings), and not all faculty may be considering such opportunities.

#### Many GFO users are not locally customizing their materials.

On several measures we found that many were not locally customizing GFO materials with their program information or local teacher salary and retirement data. Since local data is critical to the credibility and persuasion of the materials, encouraging more to undergo this customization is important.

#### Some users are not using the tested messaging.

Faculty see GFO as offering tested, fact-based resources and information (e.g. statistics and facts) but not tested messaging about those facts (e.g. specific phrasing or framing) or correction of misperceptions. While GFO presentations seem to use tested messaging (based on the student responses in post-workshop surveys), GFO users more broadly may not. On a broad survey of faculty (the FSI), almost 20% of those who used GFO to support conversations with faculty or students did *not* use the GFO messaging in those conversations, and only 29% used the messaging frequently. Since tested messaging is a research-tested way of framing the facts about teaching, it is important that users appreciate the importance of this messaging. It may be that the use of GFO messaging is well-scaffolded by the presentation materials, but not by other materials.

#### Champions presentations have lower learning and attitude gains.

Despite similar Fidelity of Implementation, the Champion presentations have lower normalized gains (43% student, 48% faculty) than do GFO/Mines or Change Agents presentations (59-66%). Thus the effectiveness of their presentations, while good, could be increased. It is possible that the lower gains are related to lack of local customization.

#### Recommendations

I thus make the following recommendations (explained in more detail <u>here</u>):

- 1. **Seek funding** To leverage this strong foundation, GFO should continue beyond the 4th year. Expand into additional audience areas and support further culture change.
- Disseminate. Continue current successful efforts, and expand especially in APS and ACS. AAPT needs to engage more with the GFO project and develop a communication strategy as well. Disseminate to related professional organizations, schools of education, and state departments of education.
- Reach and empower faculty. Change Agents should be offering more faculty workshops, not just GFO/Mines. Some Champions may be tapped to conduct faculty presentations. Champions may wish to engage with faculty informally. Show faculty how to use GFO within the constraints of their existing work structure.
- 4. **Support Champions.** Continue your excellent work so that Champions continue to reach more people, and more effectively. Give Champions ideas of structured venues where they can use GFO, and emphasize the importance of tested messaging that appeals to *students* (which may not be the same messages that appeal to faculty).

### **Report and findings**

# (1) PROJECT IMPACT: What are the effects on faculty and student perceptions, and teacher recruitment?

**Evaluation questions:** *Impact:* What is the overall impact of the project, including the potential for impact on the national teacher shortage?

#### Data reviewed in this section

- 1. Student presentation survey results
- 2. Faculty workshop survey results
- 3. Champion survey report

### About half of Champions can point to clear impacts of using GFO, including increased student interest in teaching.

In the Champion survey (N=58), 48% of respondents were able to list clear, demonstrable impacts of using GFO, often increasing the strength of their recruitment efforts. Five were able to indicate that student recruitment numbers had already been impacted. These are all very positive impacts for a fairly early stage in the project. Sample quotes:

- As a direct result of seeing a GFO presentation, students have come to talk with me to learn more about the teacher preparation program.
- We have seen an increase in the number of STEM students adding a major in secondary education.

#### GFO helps faculty examine and change their perceptions of teaching as a career.

We have many strands of evidence showing that GFO has impacted faculty perceptions. On the Champion survey, the most common direct impact of using the materials was a change in student or faculty perceptions. A majority of respondents (66% Faculty Strategy Implementation; FSI, 78% Champion) indicated that they have examined their own assumptions of grade 7-12 teaching as a result of engaging with GFO. A quote from the Champion survey:

• Even faculty who have been involved in preparing STEM educators for many years have been surprised and intrigued by the GFO data about STEM teaching in the US.

#### GFO helps empower faculty to recruit future teachers.

One of the most commonly mentioned impacts of GFO on the Champion survey was that faculty were taking more responsibility for recruiting future teachers. This is a positive, unanticipated consequence of the project – by providing information and resources, faculty are

able to develop a sense of personal responsibility and agency for this work. A quote from the Champion survey:

• Mathematics teacher educators are using them to actively recruit teachers, when they did not do that as part of their job in the past

### Both faculty and student workshops are consistently highly effective at conveying knowledge and changing perceptions about teaching as a profession.

Each GFO student presentation or faculty workshop includes a pre/post survey which includes questions testing factual knowledge about teacher salary, retirement, etc., as well as asking about perceptions of the teaching profession.<sup>1</sup> A score is assigned based on factual correctness or desirability of the answers. Averaged across 54 student presentations (N=1,605 attendees) and 42 faculty presentations (N=639 attendees), pre-post scores increase dramatically (figure below).



<sup>1</sup> Actual question text:

- How do you think teachers rate their lives compared to other types of professionals?
- Do grade 7-12 teachers have student loan forgiveness programs available to them?
- What is the average age of K-12 teacher retirement in the U.S.?
- What is the typical mid-career (15 years) salary of grade 7-12 teachers?
- What percentage of STEM students expressed some level of interest when asked the following question: "How interested are you in becoming a middle or high school teacher?"? (faculty only)
- What fraction of grade 7-12 teachers remain in the profession at year 5 (faculty only)
- What fraction of teachers report having control over what and how they teach? (faculty only)
- Approximately what fraction of teachers somewhat agree or strongly agree with the statement, "I am treated with respect by students and parents"? (faculty only)
- Teaching pays a lot less than most other careers a student can get with the same degree (agree/disagree scale)
- I want to become a grade 7-12 teacher (agree/disagree scale; students only)
- Grade 7-12 teaching is a good career choice in general (agree/disagree scale; students only)

Across knowledge and attitude questions, the average gain is 41% for student presentations (effect size 1.9), and the average gain is 45% for faculty workshops (effect size 2.3). These effect sizes are considered to be large. Normalized gains<sup>2</sup> are even greater: 54% and 64% respectively. Figure to right.

Knowledge gain is also apparent when examining results per-question. Below are charts of faculty and students with correct answers pre-and-post (averaged across respondents; N=1,657 students, N=658 faculty<sup>3</sup>). The median student post-test score is 100% and the mean is 82%. For faculty, the median post-test score is 75%, and the mean is 70%.





<sup>&</sup>lt;sup>2</sup> (post-pre)/(100-pre): The fraction of what they did not already know that they learned by the end of the workshop.

<sup>&</sup>lt;sup>3</sup> Results averaged across faculty are from Change Agent survey results, not Toolkit; Toolkit had similar pre-test results per question but higher post-test for "rate their lives" and "what percent of STEM students express interest" and lower post-test for "loan forgiveness" and "average age of retirement". Not shown for clarity are 4 additional questions asked of faculty.

**Students report important shifts in attitudes after attending a GFO presentation.** Three of the pre/post workshop questions ask about attitudes towards teaching as a career. Students, on average, report positive shifts on these questions such that they agree that teaching is a good career overall, disagree that teaching pays a lot less than other careers you can get with the same degree, and are less negative about wanting to become a teacher (figure below).



\*Reverse coded

### One-third of students shift towards greater agreement with "I want to be a teacher."

To identify the number of students who shift attitudes, I use an average across students (N=1,657 students), instead of an average of the average responses per workshop as above.<sup>4</sup> When averaging across students, the shift on "I want to be a teacher" is from -0.7 ("disagree") to -0.3 ("neutral"). One-third of students (N=553) shifted towards a more positive attitude, and 7% had a large shift in response (moving up more than one level). Figure at right.

These shifts result in fewer students who outright disagree, and more students who agree or are neutral (see figure below). Since GFO aims to reduce the barriers to students

One-third of students shifted towards agreement of "I want to be a teacher" after seeing a GFO presentation (N=553 out of 1657)



deciding to become a teacher, shifts in attitudes and understanding are very positive.

<sup>&</sup>lt;sup>4</sup> The N differs for the "by workshop" and "by student" sample because the "by student" sample includes all complete responses in SurveyMonkey, some of which may not have been included in the "by workshop" sample because they were too small for analysis.



#### Faculty also report shifts in perceptions of teacher pay post-workshop.

When averaged across workshops, faculty in workshops shift towards disagreement that "teaching pays a lot less than other careers." Their comfort in their favorite student becoming a teacher is already quite positive (on average) pre-workshop, and shifts are minimal. Note that this aligns with broader data from the PTaP.HE.



<sup>\*</sup>Reverse coded

### (2) PROJECT VISIBILITY AND REACH: Are faculty aware of GFO, how the website is used, and how many students and faculty have been reached?

Evaluation questions: National outreach: What is the overall reach of the project?

#### Data reviewed in this section

- 1. Society member survey (2021, 2022)
- 2. Website statistics
- 3. Faculty Strategy Implementation (FSI) 2022 survey awareness of GFO
- 4. Registered Change Agent activities
- 5. Registered Champion activities

#### The GFO website is well-used, with high engagement.

The website has had over 60,000 unique pageviews in the past 9 months, with a fairly long average time per page of 3 minutes. A low exit and bounce rate (65% from the home page) indicates that visitors find something useful and continue to explore the site.

#### A substantial fraction of STEM faculty are aware of the project.

On the FSI survey, which includes study sites as well as diverse recruited faculty, 41% were aware of GFO. This is a success. On the surveys of the 4 societies engaged in GFO, AMTE members were most aware of GFO (56%), and 22 respondents mentioned GFO as a resource spontaneously, before it was named in the survey. These results are a hallmark of the efforts of AMTE and the excellent fit between that society and GFO goals. Physics faculty (members of APS and/or AAPT) show high awareness of GFO (40% of faculty surveyed) but this is mostly due to the respondents who are members of AAPT: 9% of APS-only members were aware of GFO. Similarly, 5% of ACS members responding were aware of GFO. These numbers are considered a success for these large, traditional professional societies.

Figure and table: Society survey to N=151 AMTE members (2022 survey), and 324 ACS, 156 APS, 88 AAPT, 193 joint AAPT APS members (2021 survey). Full data in appendix.



#### Engaged Champions are enabling a broader project reach to student audiences.

A total of 164 student presentations were registered in 2022; 93 of these were conducted by Champions. Thus, Champions conducted more student presentations than Change Agents or PIs/Mines combined. Champions also reached more students (N~2,200) than other groups (figures below). The reach to faculty was primarily carried by PIs/Mines.

Figure: Reported Change Agent and Champion presentations to students and faculty in 2022



Figure: Estimated audience reach by reported Change Agent and Champion presentations to students and faculty in 2022



### GFO has engaged at least 6,500 students and 3,000 faculty in workshops and presentations since 2019, and an additional ~12,000 through outreach

When counting all reported estimated reach of all GFO workshops and presentations by all actors, there is an impressive reach. These numbers are a testament to the community of practice design of GFO, as well as the efforts and work of the project to date. These numbers are certainly an under-estimate, as many Champions do not report all activities. Outreach efforts (including publications, placing posters, sending email announcements, and the 2,256 views on YouTube) aimed at building awareness among students and/or faculty have reached almost 12,000 people. An additional 256 K12 teachers and students have been reached across all years of the project by GFO Mines, PIs, or Change Agents.



N attending faculty workshops	Year 1	Year 2	Year 3	Year 4	Total
Change agents	226	276	432	282	1216
Mines/Pis	246	350	297	334	1227
Champions	0	560		165	725
				Grand total	3168
N attending student presentation s	Year 1	Year 2	Year 3	Year 4	Total
Change agents	342	238	442	309	1331
Mines/Pis	79	140	301	1379	1899
Champions	0	10	55	2209	3264
				Grand total	6494

Faculty workshops	Year 1	Year 2	Year 3	Year 4
Change				
agents	12	12	14	14
Mines/PIs	10	18	15	18
Champions	0	2	2	12
Student presentations	Year 1	Year 2	Year 3	Year 4
Change				
Agents	9	8	8	8
Mines/Pis	3	5	13	23
Champions	0	3	2	93

#### Institutional reach from the project has met its intended goals.

When estimating the number of institutions represented by the faculty numbers above, I find that the project has adequately reached its goals. The original target per discipline was 80 institutions/year, or 400 institutions in 5 years. The estimated institutional reach, below, shows that each discipline has met or nearly met this goal as of Year 4. That said, these estimates certainly include double-counting of institutions, and reaching one faculty with one email at an institution is inadequate for culture change. This institutional reach includes approximately 488 high schools; 1,205 institutions of higher education have been reached.

![](_page_20_Figure_0.jpeg)

### STEM faculty seek information on K12 careers from many resources which are not targets of GFO... but could be. This is an opportunity for growth.

On the society surveys to members of ACS, AMTE, APS and AAPT, we found that the main places that STEM faculty turn to for career advice are other organizations (i.e., state, federal, professional unions, school districts, NCTM, MAA, etc.), expertise of professionals (themselves, alumni, teachers, and others with experience in the profession at hand), and campus resources (i.e., schools of education, academic advising, teacher prep programs, and career centers. ). If GFO becomes embedded more strongly within these organizations and professional communities, then STEM faculty will be directed to the project more consistently. As an example, it might be worth embedding GFO deeper or connecting more explicitly with state departments of education as this is a place where AMTE members very regularly turn for information.

### (3) NATIONAL OUTREACH: What engagement events and opportunities have been offered by GFO and Change Agents?

**Evaluation questions**: *Activity*: What kind of campaigns are developed at the national level, how do these differ by discipline?

#### Data reviewed in this section

- 1. Registered Change Agent activities
- 2. Society communication plans
- 3. Champion survey report how learned of GFO
- 4. Faculty Strategy Implementation (FSI) results how learned of GFO
- 5. Mini conference evaluation report

### The project has offered a variety of engagement mechanisms and modalities, enabling exchange of ideas and a broader awareness.

GFO has offered a variety of activities through societies, GFO staff, and national change agents. The various media offered (Newsletter, Facebook, Discussion list) also show high engagement and interest and I consider this multi-pronged strategy to be a success. These communication mechanisms include:

- 1. **Presentations at national and regional events** such as AAEE, AAPT, Noyce, PhysTEC, IUSE Summit, and UTeach;
- 2. Active Facebook group (268 group members)
- 3. Newsletter email list (568 subscribers)
- 4. Newsletters ~3-4 times per year (36% average open rate; above industry average)
- 5. Website and active blogs (>60,000 unique pageviews, 1,621 downloads; 16 blogs)
- 6. Active discussion email list (210 subscribers)
- 7. GFO mini conference (97 attendees)
- 8. YouTube videos (22 videos, 58 subscribers, over 2000 views)
- 9. **Change Agent activities** (69 total in 2022), including presentations at national and regional conferences.
- 10. All Change Agent meetings (about 2/year) updating Change Agents on the project and soliciting feedback.

#### Engagement events are successful.

Among these engagement mechanisms, the GFO mini conference was a great success; attendees were actively engaged, reacted positively to the experience, and wanted to exchange ideas with one another. Also a great success was the Mathematics Teacher Education Partnership (MTEP) pre-conference workshop, with 75 math teacher educators seeing the GFO sessions as very useful and indicating that learning about the project was one of the most

valuable aspects of the conference. Across evaluation measures, people want to stay informed about GFO, and get ideas for recruiting.

#### The blog is an effective strategy for drawing attention to the project.

The majority of visitors find the website through the popular "teacher retirement plans" blog post, and the home page (figure, right). A large number of the "other" pages are other blog posts, showing the power of the blog to draw people to the site.

### Change agents and GFO/Mines actively promote GFO.

Based on registered activities from GFO Change Agents and Mines/GFO staff, a total of 90 activities were conducted in

![](_page_22_Figure_5.jpeg)

2022, a large number of outreach and educational activities are conducted by the project. The workload of these activities is roughly equally distributed between Change Agents and GFO/Mines, showing that the project reach is enhanced by the inclusion of Change Agents. Additionally, the majority of these activities (across Change Agents, PIs, and GFO/Mines) were classified as "outreach" to other institutions. However, there is room for growth in the number of Change Agent activities.

![](_page_22_Figure_7.jpeg)

#### Change Agents have reached ~300 faculty and ~400 students in 2022.

Again, based on registered activities, Change Agents have conducted 14 faculty and 8 student presentations, reaching a large number of these audiences; see below. When combined with presentations from PIs and GFO/Mines, the project conducted **32 faculty workshops** and **31 student presentations** in 2022. Additionally, 15 presentations were conducted for K12 students

or teachers, reaching 213 individuals, and 11 outreach events were logged, reaching 2115 individuals (YouTube hits are not included in this total and account for reach to another 2000 individuals this year).

![](_page_23_Figure_1.jpeg)

#### A large number of engaged faculty have attended a GFO workshop.

In the Champion survey, 77% had attended a GFO workshop in the past. On the broader FSI survey, 71% had attended a workshop. This engagement makes it likely that these Champions are well-prepared to use GFO materials. Attending a workshop is important for Champions: As will be demonstrated later in this report, the faculty workshops are highly effective. Additionally, those respondents on the Champion survey who attend a workshop are more likely to use GFO materials (73%) than those who did not (59%), are not as comfortable giving a GFO presentation, and are less likely to engage in other GFO-recommended activities (such as speaking to students or faculty, or making local versions of materials).

#### Faculty see GFO as offering tested, fact-based resources and information.

On the Champion Survey, most felt that GFO offers resources (57%) or information (40%). However, very few indicated it offers tested messaging or correction of misperceptions about teaching. Example quotes:

- Excellent information on perceptions of teaching as a career and well-crafted and tested resources for encouraging STEM majors to consider teaching.
- It provides data regarding salaries, motivations, benefits, and challenges pertaining to STEM teachers.

#### People learn of GFO mostly through word of mouth, conferences, and email.

On the GFO Champion survey of those on the newsletter list and actively using materials (N=112), most had heard about GFO through professional conferences (33%), colleagues (28%), or email/newsletters (22%). On the FSI survey (which taps a broader range of faculty), most who knew of GFO had heard through colleagues (74%) or email (34%). On the society surveys, again, newsletters, colleagues, and conferences were most commonly identified, though the prevalence varied some by society.

### Figure: Society survey to N=151 AMTE members (2022 survey), and 324 ACS, 156 APS, 88 AAPT, 193 AAPT/APS members (2021 survey).

![](_page_24_Figure_7.jpeg)

#### The project is evolving a strong and strategic communication approach

The evaluator noted two challenges in project communication, and the project has addressed them well. The first was that the project needed to make its philosophy more explicit – that GFO is spreading positive information about the teaching profession to provide a balanced narrative, not to sweep under the rug the issues in the profession. This philosophy is now an explicit part of the presentation materials, and led to the tagline, "repairing the reputation of the teaching profession." The second issue noted was that the professional societies (AMTE, APS, AAPT, ACS) needed to more strategically use multiple mechanisms to spread the word about GFO.

Societies provided communication plans to the evaluator, which will be reviewed in 6 months. Communication plans included:

- AMTE: Organizing activities across mathematics organizations, virtual coffee and chat hours, collecting positive stories and videos, outreach via podcasts.
- APS: Focusing on giving Change Agents more agency, engaging non-active Champions, targeted webinars and coffee chats, section and regional meetings, marketing through email, and connecting with APS Careers.
- ACS: Multi-level communication plan to promote awareness from different audiences, including newsletters, email outreach, coffee chats, presentations, targeted ads, and exhibit booths.
- AAPT: None submitted.

Together, these strategies have the potential to raise awareness and understanding of GFO.

### Many faculty are interested in using GFO upon learning about the project.

In the FSI survey, 43% (out of N=131 not previously aware of GFO) indicated that they would be interested in using GFO materials now that they are aware of the project. On the society surveys, over 60% of the respondents in each society indicated that they will probably visit the website to learn more. Thus, many faculty perceive the project's value upon an initial exposure.

![](_page_25_Figure_8.jpeg)

![](_page_25_Figure_9.jpeg)

![](_page_25_Figure_10.jpeg)

Challenges in this area

### The number of faculty and students reached by Change Agents is fewer than those reached by GFO/Mines, and varies across disciplines.

Change Agent work is sharing some of the load of project outreach, but this may not be yet adequate. In a casual Change Agent evaluation, I identified a variety of engagement and leadership strategies within the disciplines, and recommended that the project engage in a focused discussion of how to create additional ownership and engagement among Change Agents. The Change Agent model is working, but it could be more effective. Change Agents could be conducting more student and faculty workshops, and increasing their engagement over time.

## (4) LOCAL CAMPAIGNS: How many local champions are there and how active are they?

**Evaluation questions:** Actor capacity: How well prepared are local champions to undertake the work? What kinds of campaigns are developed at the local levels, how do these differ by discipline, and how faithful are they to the original principles of GFO?

#### Data reviewed in this section

- 1. Registered Champion numbers
- 2. Champion activities
- 3. Champion survey report
- 4. Champion pilot interviews

### The number of engaged Champions has increased to 202 individuals at 157 unique institutions. Chemistry has undergone substantial growth in numbers.

Based on the number of identified Champions (those registered on the website and/or known users of GFO materials), The number of Champions has increased significantly since last year, from 113 to 202 individuals, representing 157 institutions. The number of activities reported by Champions has also increased. Chemistry's focused outreach has borne fruit, with the largest number and percentage growth of Champions (chart below). Based on the Champion survey, we know that most Champions play a role in teaching or recruiting future teachers.

![](_page_26_Figure_9.jpeg)

![](_page_26_Figure_10.jpeg)

#### Champions are highly positive about GFO: They feel that materials are customizable, uniquely valuable, and relevant for their recruitment efforts.

A great number of findings point to the enthusiastic reception for the GFO project and materials. From the Champion survey:

- 89% of comments were positive when asked about the experience with GFO
- 88% agreed that GFO is highly relevant for their primary recruitment audience and this was true across several recruitment audiences.
- 98% agreed with the statement, "I feel confident that the data provided by GFO is accurate and trustworthy"
- 96% agreed with the statement, "GFO provides needed resources and supports that I cannot find elsewhere."
- On open-ended questions about their interest in GFO, most indicated they engaged with the project because GFO is **relevant** (44% of open-ended responses) and **valuable** (28% of open-ended responses).

Respondents most often mention the customizable materials and templates, and access to local data, as being important. Most indicate that the facts and data are valuable for making a pitch for science teaching as a career. Sample quote:

 I have been promoting STEM teaching for 35 years and lacked GOOD resources. I immediately recognized the value of the resources GFO provided, even early on in the program.

#### Champions are actively spreading the messages of GFO to students (and to faculty to a lesser degree), reporting 125 presentations reaching ~3000 students

Based on registered Champion activities, they have conducted a total of 108 student presentations (a growth of 100% over 2021), reaching large numbers of students. They have also conducted a total of 34 faculty presentations reaching ~700 faculty. As discussed earlier, Champions nearly doubled GFO's reach to students, conducting more student presentations and reaching more students than Change Agents or PIs/Mines combined.

![](_page_27_Figure_11.jpeg)

2979

### Champions are conducting both faculty and student presentations with some fidelity to the original GFO principles.

A set of questions on post-presentation surveys assess critical elements of Fidelity of Implementation, such as whether workshop participants feel that the core message of GFO was emphasized, on a scale from -2 to +2. On all these questions, respondents in Champions' presentations rate them as well or better than those in presentations conducted by GFO/Mines or Change Agents.

![](_page_28_Figure_2.jpeg)

**Champions' presentations to students and faculty have lower gains than do Mines or Change Agents – despite similar levels of fidelity of implementation.** Averaged across workshops, Champions' faculty presentations have consistently lower normalized gains (48%) than do Change Agents or GFO/Mines staff (66% and 60% respectively). (While non-normalized gains are also lower, the difference falls within the standard error.) The same is true of student presentations: Champions have lower gains and normalized gains (33% and 43% respectively) than Change Agents (48% and 66% respectively) or GFO/Mines (43% and 59% respectively). See graphics below. This is true despite the fact that questions rating fidelity of implementation were similar or better for Champions compared to other groups as shown previously. Note however that this is based on only N=5 Champion faculty presentations and N=12 student presentations, as many Champions do not use the pre/post survey.

![](_page_29_Figure_2.jpeg)

![](_page_29_Figure_3.jpeg)

**Only half of Champions are active, most have not done a student presentation.** Champions are asked to register their activities on the website; only about half have registered at least one activity (i.e., are "active"; see graphic below). Only 22% have registered a student presentation. These findings are problematic because Champions are expected to undertake GFO activities, and to spread the word to students. Chemistry Champions are least likely to be active or to do a student presentation, but this is to be expected since many are newly added.

![](_page_30_Figure_1.jpeg)

#### Figure: Champion activity registration results (N=202 Champions)

### A significant barrier to faculty engagement is their time. This limits GFO's ability to engage with champions to build expertise and engagement.

"Time" as a significant barrier to using GFO was mentioned in many places, including responses to the Fall GFO Mini Conference, the FSI, and the Champion survey. "I don't have time" was the most frequent reason to not use the materials on the FSI (59% of non-users; graphic below). Incorporating local data is one of the time challenges noted by respondents on the FSI. Champions' lack of time may be the underlying cause behind one of the project's main challenges – engaging Champions and prompting them to action. Some events offered for Champions by societies are poorly attended (e.g. a recent 'coffee chat' from ACS). Change Agents indicate that they do not get a response from most Champions they contact.

#### Figure: FSI results from N=91 respondents who do not use GFO.

Note that among those selecting "other" the most common codes were aligned with "I don't have an opportunity to use the materials:: the person did not know where or how to use GFO or felt that it was someone else's responsibility. Thus an area of growth might be helping faculty find or create such opportunities and to take on the responsibility for using GFO.

![](_page_31_Figure_2.jpeg)

#### Some champions encounter skeptical reactions to GFO.

While rare, one of the consistent reactions to GFO from Champions is a skeptical reaction from the respondent, or faculty colleagues, indicating it is not relevant for their state, or that the materials gloss over certain realities. This was true on the Champion survey, FSI survey, and MTEP conference survey, but only a few responses on each of these instruments. Only a few responses on the FSI indicated that they did not use the materials because they don't trust them.

# (5) USE OF MATERIALS: Which GFO materials and approaches are used and how?

**Evaluation questions:** *National outreach*: What is the overall use of the project materials? Who uses the materials and what are their perceptions of the materials? How faithful are these activities to the original principles of GFO?

#### Data reviewed in this section

- 1. Champion activities
- 2. Faculty Strategy Implementation (FSI) results activities used, conversations
- 3. Champion survey report
- 4. Website statistics materials use

### GFO materials are used by about half of surveyed faculty.

Across many evaluation metrics, I find that GFO materials are being used by a large fraction of people surveyed or engaged:

- Most newsletter subscribers have used GFO materials (60%; N=58 responses; Champion survey)
- A large fraction of FSI respondents have used GFO materials (40%; N=220 responses); graphic right.
- About half of registered Champions have conducted at least one activity.

![](_page_32_Figure_12.jpeg)

#### The most popular GFO materials are the

#### website, student presentations, data handouts, and infographics.

We have several strands of evidence about the most popular GFO materials. The most popular materials are listed below, along the percentage or number of respondents<sup>5</sup> on each evaluation instrument who use them:

- 1. Website (77% Champion survey. Not listed on other instruments.)
- 2. **Student presentations** (65% Champion survey; 62% FSI; 93 Champion activities; 3rd most popular download on web)
- 3. **Data handouts** (69% FSI survey; 32% Champion survey; 19 Champion activities; 4th most popular download on web). *Note that the FSI respondents may be conflating data handouts and infographics.*

<sup>&</sup>lt;sup>5</sup> On the Champion activity registration, the number is the number of reported activities, not of Champions. Student presentations and 1:1 conversations were the most commonly reported activities.

4. Infographics (30% Champion survey; not included on FSI; most popular download).

The least commonly used materials are:

- 1. **Faculty workshop** (30% Champion survey; 27% FSI; 12 Champion activities; 6th most popular download on web)
- 2. **PTaP/PTaP.HE** (35% Champion survey; 33% FSI; not tabulated Champion activities; least popular download on web)
- 3. Reach Students (13% Champion survey; 21% FSI; not tabulated Champion activities)
- 4. **Take the Next Step** (6% Champion survey; 22% FSI; not tabulated Champion activities; 2nd least popular download on web).

Other information of note about use (figure below): The reported use of student presentations and one-on-one conversations (based on activity registration) among Champions has grown substantially over the past year. While still low, researching local data and social media have increased. The use of faculty workshops has decreased over time. The science and math brochures and posters are much more popular downloads than physics or chemistry.

![](_page_33_Figure_7.jpeg)

### GFO materials are mostly used in structured venues: Classrooms, student clubs, faculty meetings, and advisor meetings.

Based on FSI results (below), these structured opportunities account for most of the GFO venues.

![](_page_34_Figure_2.jpeg)

#### Figure: FSI results from N=109 respondents with a variety of experience with GFO

#### Challenges in using GFO materials are not consistent.

In both the Champion survey and the FSI survey, GFO users have cited challenges. However, the challenges are typically idiosyncratic, not falling into easily codable categories. This is a good sign, indicating there is not some consistent, major challenge in the GFO materials. Many respondents indicate no challenges.

#### Challenges in this area

#### Many GFO users are not locally customizing GFO materials.

On the Champion Survey, 60% or fewer<sup>6</sup> agreed that they had added their program information to GFO resources, created their own materials, or added local teacher salary data to materials. On the broader FSI survey, even fewer indicated that they had done so: 43% indicated that they had looked up or examined local data on teaching careers, 28% indicated that they had created local versions of GFO materials, and 19% indicated that they frequently used locally relevant data when using GFO. Most Champions (72%) were aware that GFO can provide this local data. Since local data is critical to the credibility and persuasion of the materials, encouraging more to undergo this customization is important.

<sup>&</sup>lt;sup>6</sup> Encouragingly, however, those who have used the student presentations are more likely to have done these local customizations (~75%). Local customization is particularly important for the student presentations.

### While GFO users are talking to faculty about GFO, they are not using the tested and effective faculty workshops.

In interviews, many Champions indicated that they were reluctant to give faculty presentations. This appears to be a somewhat widespread feeling. On the Champion Survey (N=76), only 30% of those using GFO indicated that they had used the faculty workshop. Additionally 85% indicated that they feel comfortable giving a GFO presentation to faculty - much lower than their confidence giving a student presentation. However, in that same survey, a majority (91%) indicated that they had talked to faculty at their institution about GFO, and 48% indicated they had talked to faculty outside their institution. These colleagues included STEM faculty, those in the schools of education, advisors, chairs, and deans. On the FSI, which targets a broader range of faculty, 53% indicated that they talk to faculty about teaching at least once/month (figure below). However, 65% indicated that they rarely or never seek out opportunities to share information about teaching — there is room for growth in faculty sense of responsibility for spreading information about teaching and GFO. Perhaps GFO can actively support Champions in engaging with faculty about teaching as a career through less formal means than faculty presentations and/or making use of structured opportunities (such as faculty meetings) to share GFO. It may be more realistic to support Change Agents and specific Champions in using the pre-developed faculty workshops.

Figure: FSI results from N=525 respondents with a variety of experience with GFO (N per question indicated in graphic).

![](_page_35_Figure_3.jpeg)
#### Fidelity of Implementation of GFO is mixed.

On the FSI survey, a series of questions asked whether GFO users engaged in various aspects of GFO, such as using tested messaging, avoiding voicing misperceptions, and sharing locally relevant data. The results were mixed, with 30-40% engaging in these desired behaviors consistently (graphic below). Some indicated that they **never** engaged in these behaviors (not shown): Almost 20% **never used messaging from GFO** or **shared locally relevant data** when engaging in conversations with students or faculty about teaching.

Figure: FSI results of those using GFO. "Please indicate how of often you have done each of the following while discussing grade 7-12 teaching with a student or colleague, since learning about Get the Facts Out."



Figure: Data from pre-post presentations surveys, average across N=54 student presentations (N=1,605 participants).



Figure: Data from pre-post workshop surveys, averaged across N=42 faculty workshops (N=639 participants).



#### Piecemeal use of materials may be another issue of Fidelity.

Champions may be choosing some pieces of the material (such as the data) and using it without the accompanying messaging and tested photos. In interviews, some Champions indicated that they use the GFO materials piecemeal – taking facts and sprinkling them into existing presentations, replacing images with those of their students. In the FSI survey, several respondents indicated that they have used GFO data without using the pre-made resources, such as incorporating GFO slides and facts into presentations or conversations. On the other hand, in the Champion survey, 100% indicated that they would use at least some of the GFO materials as-is.

# RECOMMENDATIONS: What might the project do to continue its excellent growth?

These results are very impressive, and the project and its community should be proud of all that it has accomplished. I could easily simply tell the project to continue to do all the strong work it has already done. While the project has areas of growth, what it is doing <u>is working</u>, and nothing is broken. Overall, the Theory of Change is finding support in that the community engagement is leading to broad reach of students through faculty Champions, and broad reach of faculty through a multifaceted outreach and engagement strategy that leads to enhanced knowledge about teaching as a profession and positive perceptions of the career.

Here are my recommendations for the project in its final year to further this growth.

#### 1. Seek funding.

There is simply more to do in this project. There are additional audience areas into which the project can expand, such as schools of education, sister organizations such as NCTM, state departments of education, K12 professionals, and so forth. Additionally, there is growing desire for pandemic-era teaching data; the resources from GFO will require constant updating over the next several years to maintain consumer confidence. GFO must be funded for a longer duration to continue this work, and for time for culture change to take hold in departments.

#### 2. Disseminate.

The successful efforts ought to continue, especially within the more traditional societies of APS and ACS whose members do not traditionally see teacher education as part of their work. The disengagement of AAPT is a concern, given the importance of these education-focused individuals in spreading GFO's work within physics. Reviewing the Communication Plans periodically is likely to be fruitful. AMTE's stated strategy of connecting with related organizations is supported by the society survey data (showing that many members go to such organizations for information about teaching careers). Other societies might consider this approach as well, plus finding ways to embed GFO messaging in other projects and career-education efforts – especially those reaching advisors, K12 professionals, schools of education, and state education departments.

#### 3. Reach faculty.

GFO needs to reach more faculty with the message of GFO. Change Agents should be offering more faculty workshops, especially regional and national ones. GFO/Mines is still trying to do it all, running GFO and conducting multiple faculty workshops, and this work needs to be spread more to the Change Agents. Resources such as faculty-facing posters might be valuable – and could be a worthwhile engagement of Change Agents. The Change Agent model requires some brainstorming, as a casual evaluation showed that Change Agents were more engaged in the disciplines where they had more responsibility and ownership for the society activities.

But the job of reaching faculty doesn't need to rely only on Change Agents; certain Champions are likely able to conduct effective faculty workshops, and could be identified (e.g. a Faculty Champion Group) and directly trained in doing such work – rather than hoping that all Champions might do faculty workshops. Also, faculty are talking *informally* to other faculty at their institution or other institutions. Providing Champions with data sheets and talking points for use with faculty (much as you do for students) could be an effective strategy. YouTube videos are not getting adequate usage yet; faculty dissemination can also focus on how to use these videos and why students react well to them.

#### 4. Empower faculty

One of the important outcomes of GFO is that faculty feel knowledgeable and able to spread information about teaching. This is powerful, and is also an area for growth; many who are not using GFO indicate they don't do so because they lack knowledge about the teaching profession, and don't know how or where they would use GFO, or feel that it is others' responsibility. Much of the GFO work focuses on the facts, and GFO communication might focus more explicitly on where and how a typical STEM faculty member would use GFO. Additionally, the limiting reagent of most faculty engagement is *time*. While this isn't a solvable problem, I did notice that most faculty meetings, and advisor meetings. The use of such structure *reduces* the time required because these are parts of a faculty member's existing work responsibilities. Focus GFO communication on how to use GFO in these venues, to reduce barriers to use.

I look forward to seeing how GFO evolves in this final year of funding.

# **Appendix: Data tables and charts**

### 2021 Annual Report recommendations

#### Last year's successes

#### [1] Significant engagement of champions across disciplines.

As a whole, the data in this report conveys the depth of effort and activity that has occurred within the project. For example:

• 345 people on the email list, and 206 on the Facebook group, with an open rate and click-through rate on the newsletter that demonstrates its value.

• 113 engaged champions from 89 institutions, of which at least 65 are active, and 15 are very active. Champions conduct mostly one-on-one conversations, student presentations, and use posters and fliers, as they reach student audiences.

• Many champions make positive comments when entering their activities. For example, "We love your work. It is an excellent resource," and "Thank you for the phenomenal work that you do!"

# [2] Significant and expanded contact with intended audiences reaching over 5000 people (this year) and an estimated 1000 institutions (to date).

Across champions and change agents, many faculty and students were reached.

• Champions conducted 32 student presentations (reaching ~1055 students) and 22 faculty workshops (reaching ~560 faculty members).

- Change agents conducted 73 activities: 26 chemistry, 12 math and 35 physics.
- GFO/Mines staff are incredibly active conducting over half of registered activities and reaching many faculty and students.
- A total of 138 workshops were conducted by change agents and PIs/staff: 26 by chemistry, 11 by mathematics, 33 by physics, and 68 by GFO staff. 41% of these are regional or national.

 Across champions, change agents, and GFO staff, a total of 81 student presentations, and 105 faculty workshops were delivered in Year 3. These have reached approximately 5200

people (2700 students and 2500 faculty). This is an expansion of almost 4 times the number of audience members reached in the previous year.

• Across Years 2 and 3, as many as 1029 institutions have been reached by the project (~615 Physics, ~166 Chemistry, ~248 Mathematics).

Table: Student and faculty presentations conducted by GFO in Year 3				
	Student presentation		Faculty workshop	
	Number	Est. participants	Number	Est. participants
Champions	32	1055	22	560

Change agents	24	1090	36	977
Pls/staff	25	596	47	971
Total	81	~2741	105	~2508

#### [3] Highly effective professional development workshops.

Analysis across workshops with pre/post results show that these workshops and presentations are highly effective for multiple presenters:

- 42% gain / 54% normalized gain for student presentations (1.98 effect size)
- Shift in student perceptions towards seeing teaching as a good career, that it pays similarly to other careers, and less negativity towards becoming a teacher.
- 43% gain / 60% normalized gain for faculty workshops (2.07 effect size).
- Shift in faculty perceptions towards seeing that teaching pays similarly to other careers, and becoming more comfortable with a favorite student becoming a teacher.
- Adequate fidelity of implementation for the average workshop.

#### [4] Significant national reach in terms of awareness and website use

A study of national reach demonstrated impressive results:

- 20,186 unique website sessions and 31,680 pageviews, which have grown over time to over 3000 sessions per month.
- 1584 GFO materials downloaded, though these rates have levelled off.

# [5] A surprising fraction of society members are aware of GFO, though typical society members do not necessarily see the value of GFO.

Across all respondents, 24% had heard of GFO, or thought they might have, though many of these positive responses are due to the high awareness among AAPT/PhysTEC members. The greatest awareness is among those who are members of both APS and AAPT (40%) or PhysTEC. Additionally, 9% spontaneously indicated that they would turn to GFO (even before it was revealed that the survey was about GFO). Awareness of GFO was not as high among members of the more traditional scientific societies (APS and ACS); just 8% and 5% respectively. However, this is considered a surprisingly high fraction for those traditional societies. Most have heard of it through newsletters and conferences from the society, as well as from colleagues. In the society survey, those who were not aware of GFO did not typically plan to visit the website. They may need a more thorough intervention to see the value. Survey respondents had several good suggestions of how to spread the word about GFO.

# [6] A wide variety of dissemination mechanisms and continuous iteration of project activities.

The project has engaged in extensive continuous improvement, flexibly and dynamically evolving over time to address issues of time, communication, messaging, and scaling. The data in this report shows an extensive array of activities as partners attack dissemination from every angle, from social media, to an effective newsletter, to engaging champions and supporting them in novel ways, to conducting workshops.

#### [7] A strong early showing by Mathematics/AMTE

Despite this being the first year of involvement in GFO, AMTE has garnered much success, including:

- 11 workshops by Mathematics change agents, a large percentage of which are national or regional (54%), and a large percentage of which are faculty-facing (82%).
- 32 champions
- 248 institutions reached, over 200 of which were in the last year of the project.

Last year I indicated that number of faculty reached by the change agents may be adequate to reach the desired national reach, if the following conditions were met:

- 1. The workshops are persuasive, using the critical features of Get the Facts Out (i.e. fidelity of implementation).
- 2. The number of national, faculty-facing workshops are increased, especially for chemistry.
- 3. The workshops include faculty from a variety of institutions of higher education.
- 4. The workshops include a bid for faculty to "get the facts out" as local champions.
- 5. The workshops are accompanied by strong national campaigns for repeated exposure to the messages of GFO.

To date, all of these criteria have been met. This is a significant accomplishment.

#### Last year's challenges and recommendations

The primary challenges of the project at this point are:

#### [1] Many activities are local

Across the activities reported by change agents and PIs, only 47% of activities and 41% of workshops were national or regional. Given that the focus of GFO is on persuading many faculty to take up GFO locally, I feel the regional and national focus should grow significantly in order to reach these local actors.

#### [2] Less expansive outcomes from Chemistry, with less focus on faculty

Across many measures the outcomes from Chemistry are not at the same level as the other disciplines, such as:

- Chemistry change agents are conducting equal numbers of faculty and student-facing workshops, but a greater number of students are being reached through those workshops.
- A lower number of estimated institutions reached (166 compared to 248 in Mathematics and 615 in Physics).
- 8 Chemistry champions (compared to 47 Physics and 32 Math)
- Only one Chemistry champion conducted a student workshop (compared to 17 Physics and 7 Mathematics).

• Lower awareness of GFO among society members (5% compared to 8% in APS and 27% in AAPT). Out of 350 ACS respondents, 50 suggested emailing the membership about GFO.

The low count of national, faculty-facing workshops in Chemistry is likely contributing to the lower awareness, and lower activity of chemistry change agents. However, Chemistry is perhaps in the toughest spot of the 3 disciplines in that it is a society for research-focused professionals (compared to AMTE, which focuses on teacher education), and does not have an existing depth of community building around teacher education (as does APS/AAPT/PhysTEC).

#### [3] Study sites are a nexus of activity

GFO Study Sites account for half of champion institutions, and are more active in conducting activities (including student presentations): 70% of GFO study sites conducted at least one activity (compared to 50% at other institutions), and 64% have done a student presentation (versus 26% at other institutions) . This in itself is not a bad thing, but engaging champions beyond study sites is also important. Non-GFO site champions may not be aware that student presentations are a powerful intervention.

# [4] The main places that society members seek career information are not a focus of GFO.

In the society survey, those who mentor undergraduates were asked where they find information about K-12 teaching careers. Most explained that they would reach out to teachers, including former students who are teachers (31%), and to their local schools of education (47%). This was especially true of ACS members. Neither of these audiences are a focus of GFO. Respondents suggested these audiences, and others, as the target of additional dissemination from GFO.

#### **Recommendations**

- 1. **Continue the good work** of engaging across disciplines and tracking champions. Additionally, encourage more conversation across societies and change agents about what they are doing and what is working.
- 2. Continue to spread the word about GFO in societies through multiple mechanisms. Awareness is growing but still modest, and is higher among audiences that have received multiple touches about GFO (i.e. APS/PhysTEC/AAPT audiences). Use newsletters, conferences, presentations, workshops, webinars, and more. Society survey respondents suggested emailing the entire society about GFO in a solo email, and including a little bit in every society newsletter. They also suggested paper flyers, social media, a "program in a box," and featuring GFO in society periodicals. Given that many respondents would start with internet searches, is the GFO site adequately SEO-optimized?

Additionally, I suggest you review the data in the report on the tracked website links; who could be promoting the website more actively?

- 3. Include dissemination to K-12 teachers and schools of education. These are go-to places for many of the professionals we surveyed (and the first place that many would begin to seek out information). If these audiences know about GFO, they are likely to be able to spread the word to their disciplinary faculty colleagues. The successful efforts of STEP-UP to engage K-12 faculty might be leveraged. Survey respondents also suggested reaching out to state departments of education and Noyce sites.
- 4. Include dissemination to chairs, deans, society chapter leaders, and student chapter leaders. These were suggested audiences from the respondents to the society survey.
- 5. Encourage non-GFO site champions to use student presentations and conduct activities. Give them specific recommendations of what to do and ask them to log their activities each semester.
- 6. Focus change agent activities on regional and national workshops. I would like to see the percentage of activities and workshops that are at this scale grow.
- 7. Engage in strategy for Chemistry/ACS national activities. Chemistry's reach is lowest among the three disciplines. That said, Chemistry is perhaps in the toughest spot of the 3 disciplines in that it is a society for research-focused professionals (compared to AMTE, which focuses on teacher education), and does not have an existing depth of community building around teacher education (as does APS/AAPT/PhysTEC). In particular what could be improved is the number of faculty reached through change agent workshops, the number of institutions reached, increased focus on recruiting Chemistry champions, and encouraging existing Chemistry champions to conduct student presentations. Consider whether you might need to expand the change agent group to include those with additional expertise or connections. National dissemination may need to be enhanced to increase general awareness as well: Particular recommendations from ACS members were emails to society membership (mentioned by 50 out of 350 respondents), inclusion in the ACS newsletter, banner ads in C&EN, local ACS chapters, and student ACS groups, and AACT.

### All data on GFO use across surveys

FSI:



# Data handouts and student presentations are the most commonly used on the FSI survey



Champions:



#### Percentage of Newsletter Only respondents who used any of the GFO materials, N=58 responses

Percent of all respondents indicating to the degree they have used these GFO resources or materials, N=58 responses



I have used this in some way

#### Champion registration:

Number of champion activities		
GFO Activity	2021 report	2022

One-on-one conversation student or faculty	60	93
Student presentation	46	93
Posters	33	17
Fliers	29	38
Faculty workshop	26	12
Research local data	16	36
Brochure	12	19
Data handout	9	19
Social media	5	30
Other / PTaP / survey	21	27
Total activities (double counts team activities)	267	384



Web:

# All data on GFO awareness across surveys



### Champion survey graphics (selected)

Where respondents heard about GFO (percent out of 102 respondents)



GettheFactsOut.org website Student presentation, "Busting ... 33% Other (please specify): Posters, "Teach Science/Math! ... 28% Flyer template 40% Brochures PTaP or PTaP.HE survey 15% National data on teaching from ... 32% Data handouts 55% Infographic: A Teacher's Life By ... Faculty workshop, "Teaching: ... Pre/post survey supplied with the ... Reaching students Implementation checklists for ... Taking the Next Step 6% 37% 0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100% I have used this in some way

Percent of all respondents indicating to the degree they have used these GFO resources or materials, N=58 responses

The percentage of respondents who previously attended a GFO presentation, workshop, or webinar, percent out of N=62 Newsletter Only and N=39 Champion responses



Percentage of Newsletter Only respondents who used any of the GFO materials, sorted by if they attended a GFO presentation/workshop/webinar and with all undergrad and grad students removed, N=48 responses



The percentage of all respondents who previously attended a GFO presentation, workshop, or webinar, sorted by discipline, N=101



🜒 Yes 🛛 🔵 No

Percent of all respondents who indicate the GFO is highly relevant for their primary recruitment audience(s), N=59 responses



Percentage of Newsletter Only respondents who used any of the GFO materials, N=58 responses



### Change Agent activity tracking

Change agent activities were sorted by year according to the following dates:

- Years 1-2: 2019- 6/18/2020
- Year 3: 6/19/2020-6/18/2021
- Year 4: 6/19/2021-6/8/2022

#### Numbers:

- · Chem: Jennifer Nielson: 5. Ellen Yezierski: 1. Terri + Jenn: 2
- Math: Jean Lee: 7. Tim: 1. Glenn: 2. Amy, Gary were 2nd on at least 2.
- Physics: Duane: 3. Tonya: 2. Steve: 2
- PI: Terri: 3, plus some group ones. Mark. Annelise.

2018-2019	Faculty workshop	Student presentati on	K12 teachers/stu dents	Research product	Awarenes s outreach	Total	
N offered change agents	12	9	0	0	2	23	
N offered Mines/Pis	10	3	1	2	0	16	
Total	22	12	1	2	2	39	events
N attending change							
agents	226	342					
N attending Mines/Pis	246	79					
Total	472	421	13	0	130	1036	reached

2019-2020	Faculty workshop	Student presentati on	K12 teachers/stu dents	Research product	Awarenes s outreach	Total	
N offered change agents	12	8	1	1	10	32	
N offered Mines/Pis	18	5	0	16	4	43	
Total	30	13	1	17	14	75	events
N attending change agents	276	238					
N attending Mines/Pis	350	140					
Total	626	378	15	25	6138	7182	reached
2020-2021	Faculty workshop	Student presentati on	K12 teachers/stu dents	Research product	Awarenes s outreach	Total	
N offered change agents	14	8	0	0	4	26	
N offered Mines/Pis	15	13	1	19	9	57	
Total	29	21	1	19	13	83	events
N attending change agents	432	442					
N attending Mines/Pis	297	301					
Total	729	743	15	120	1198	2805	reached
<b>2021-2022</b>	Faculty workshop	Student presentati on	K12 teachers/stu dents	Research product	Awarenes s outreach	Total	
in offered change agents	14	ö	¥	ν	ъ S	<u>∠1</u>	

N offered Mines/Pis	18	23	11	3	8	63	
Total	32	31	13	3	11	90	events
N attending change							
agents	282	309					
N attending Mines/Pis	334	1379					
Total	616	1688	213	32	2115	4664	reached





# Champion numbers

Number of champions 2021

	N of champions	N of active champions (at least 1 activity)	N of champions doing student presentations	% of discipline's champions active / doing student presentation
Chemistry	8	4	1	25%
Physics	47	33	16	34%
Math	32	21	7	22%
Other	26	6	4	15%
TOTAL	113	65	28	25%

Number of champions over time

Number of champions 2021-2022			
	N of champions 2021	N of champions added in 2022	
Chemistry	8	29	
Physics	47	16	
Math	32	26	
Other	26	26	
TOTAL	113	97	

Doesn't add up to the total number below because of slight data discrepancies (N=8).





Total number of champions as of 2022				
	Total N of champions (% of total)	N of active champions (at least 1 activity)	N of champions doing student presentations	% of discipline's champions active / doing student presentation
Chemistry	36 (18%)	14	6	37% / 16%

Physics	62 (31%)	39	19	63% / 31%
Math	54 (27%)	37	12	66% 21%
Other	50 (25%)	18	8	38% 17%
TOTAL	202	108	45	53% / 22% of total

\*There is a discrepancy of 8 champions and I forced it in the graphics.



■Yes ■No

Number of champion institutions as of 2022			
	N of institutions		
Chemistry	36		
Physics	51		

Math	47
Other (mostly Ed)	45
TOTAL	169 non-unique Unique: 150 +7 non IHE

# **Champion Activity Tracking**

Number of champion presentations							
	N faculty presentationsN faculty reachedN student presentationsN students reached						
2021	22	560	32	1055			
2022	12	165	93	1924			
Total	34	725	125	2979			



In 2022 N=384 new activities by at least 63 champions.

Includes those from registration as well but didn't count unique champions in registration

Number of champion	Number of champion activities					
<u>GFO Activity</u>	202 <u>1</u> <u>rep</u> <u>ort</u>	<u>20</u> <u>22</u>				
One-on-one conversation student or faculty	60	93				
Student presentation	46	93				
Posters	33	17				
Fliers	29	38				
Faculty workshop	26	12				
Research local data	16	36				
Brochure	12	19				
Data handout	9	19				
Social media	5	30				
Other / PTaP / survey	21	27				
Total activities (double counts team activities)	267	38 4				









### Reach across change agents and champions







	Faculty engaged in workshops since 2018	Students engaged in presentations since 2018	Those reached at lower awareness- building
Champions	725	3264	
Change agents	1216	1331	
PIs/staff	1227	1899	
Uncategorized			11837
TOTAL	3168	6494	11837

N attending faculty workshops	Year 1	Year 2	Year 3	Year 4	Total
	226	276	422	202	
Change agents	226	276	432	282	1216
Mines/Pis	246	350	297	334	1227
Champions	0	0	560	165	725

N attending student presentations	Year 1	Year 2	Year 3	Year 4	Total
Change agents	342	238	442	309	1331
Mines/Pis	79	140	301	1379	1899
Champions	0	0	1055	2209	3264

Faculty workshops	Year 1	Year 2	Year 3	Year 4
Change agents	12	12	14	14
Mines/PIs	10	18	15	18

Champions 0

Student presentations	Year 1	Year 2	Year 3	Year 4
Change Agents	9	8	8	8
Mines/Pis	3	5	13	23
Champions	0			93

Number of institutions change agents and champions. Target 80 institutions per year / 400 in 5 years per discipline						
	Change agents 2020	Change agents 2021	Champions 2021	Change agents 2022	Champions 2022	Total
Chemistry	20	136	10	22	29	217
Physics	86	400	129	20	16	652
Math	25	180	43	109	26	383
PIs/STEM/GFO				768		768
TOTAL	131	716	182	919	71	2019

\* 730 of chemistry are emails to chem departments.
\*\*488 of physics are HS. \*\* 730 of PI activities are individual emails to chem departments
\*\*\* without HS, 1205 institutions of IHE

-

6494

12

	Change agents	Champions	Total
Chemistry	920	39	959
Physics	995	145	1140
Math	314	69	383
GFO/other			
	333		333
Total	2562	253	2815

### Web statistics



Seems like recruiting resources could be higher. Just as high as prospective teachers when that's not the main audience? But more students than faculty. And not counting some subpages. 1350 hits on pages with "presentation" in title. 500 with poster in title.

Some top pages.

Page	Unique Pageviews
Total	60516
/teacher-retirement-plans/	20672

/blog/how-do-teacher-retirement-plans-work	11062
/	8964
/prospective-teachers/	1255
/facts-and-data/	1058
/life-as-a-high-school-physics-teacher/	981
/recruiting-resources/	944
/life-middle-school-math-teacher-career-advice-front-lines/	872
/gfo-newsletters/	703
/gfo-community/	608
/teacher-salary-data/	559
/recruiting-resources	514
/life-high-school-chemistry-teacher/	494
/presentation-faculty/	491
/test-your-knowledge/	433
/presentation-students/	418
/facts-and-data	386
/blog/life-high-school-physics-teacher-career-advice-front-lines	385
/prospective-teachers	364

/blog/career-advice-front-lines-discussion-middle-school-science-teacher	357
/gfo-community	351
/state-loan-forgiveness/	321
/become-gfo-champion/	281
/about/	279
/poster/	239
/data-handouts/	237
/presentation-faculty	223
/research-and-publications/	212
/blog/top-3-reasons-science-and-math-students-want-become-teachers	206
/blog/life-high-school-chemistry-teacher-career-advice-front-lines-0	202
/did-you-know	197
/middle-school-science-teacher/	191
/blog/	183
/become-gfo-champion	168
/poster	163
/flyer/	155
/blog	149

/test-your-knowledge	137
/brochure/	134
/register/	129
/about	129
/find-certification-program/	126
/presentation-students	121
/404.html?page=/blog/how-do-teacher-retirement-plans- work&from=https://www.google.com	116
/the-problem	115
/activity-log/	109
/reach-students/	106
/404.html?page=/blog/how-do-teacher-retirement-plans- work&from=https://www.google.com/	98
/share-your-passion-your-students/	95
/perceptions-surveys-ptap-and-ptaphe/	89
/tested-messaging/	89
/video-library/	86
/brochure	82
/blog/life-middle-school-math-teacher-career-advice-front-lines	79

/flyer	78
/tag/teacher-retirement/	77
/our-research	72
/state-loan-forgiveness/?listserv=Jan9	62
/how-get-facts-out-addressing-diversity-inclusion-and-access/	60
/did-you-know/	58
/find-certification-program	53
/get-involved	52
/perceptions-surveys-ptap-and-ptaphe	50
/get-facts-out-newsletter	50
/what-are-get-the-facts-out-change-agents-doing/	50
/blog/how-do-i-use-get-facts-out-resources-effectively	49
/mini-conference-blog/	49
/do-college-faculty-members-support-grade-7-12-teaching/	49
/tested-messaging	47


## Post-workshop survey responses

### **Across workshops**

Note that these results only represent the fraction of attendees with usable, complete pre/post results. It was not unusual for these to be available for only 50% of attendees. Thus, there are significant self-selection effects.

Each workshop includes a pre/post survey which includes "quiz" questions testing factual knowledge and perceptions. An overall pre/post quiz score is assigned to each respondent based on the factual correctness or desirability of the answers. The data below represents these quiz questions and scores, averaged across workshops. The workshops included are also tallied.

Reporting results across workshops not across attendees. Last year found that it was very similar. Across the whole project, 2019-2022. Removed those with fewer than 3 attendees

	Student presentation (across workshops)	Faculty workshop (across workshops)
Total N of events	54	42
Total N of attendees (average)	1605	639 (15)
Average pre-test	31%	35%

Average post-test	72%	75%
Average gain	41%	45%
Average effect size on the gain	1.88	2.29
Average normalized gain	54%	61%

Shifts on key questions for student presentation

	Pre	Post	Gain
Teaching is a good career overall	0.55	1.06	1.12
Teaching pays a lot less than careers with the same degree	-0.65	0.47	0.37
I want to become a teacher	47	-0.09	0.51

Correlation:

+0.28 between fidelity and gain in want to become a teacher. None on gain. Done on workshop. No correl on per student.



Shifts on key questions for faculty workshop

	Pre	Post	Gain
Teaching pays a lot less than careers with the same degree	-0.57	0.62	0.25
I would be comfortable with my favorite student becoming a teacher	1.26	1.51	1.19









### **Across students**

N of responses: 2010. N of complete responses: 1657 (82%)

14% physics, 15% chemistry, 9% math, 32% engineering, 13% other STEM, 8% other education, 10% other

Feedback questions all averaged 3-4, agree or strongly agree, showing good fidelity.

### Post-test responses (% questions correct) – fact based only

	Medi an	Mean
All responses	100%	82%

	% correct pre	% correct post
How do you think teachers rate their lives? <i>Answer: Near the top</i>	31% Most common was "middle of the pack"	86% Most common answer is correct answer.
Do teachers have student loan forgiveness programs? <i>Answer: Yes,</i> <i>and most qualify</i>	33% Most common was "I have no idea"	90% Most common answer is correct answer.

What is the average age of teacher retirement? Answer: 59 years	24% Answer choices distributed broadly	76% Most common answer was correct answer	
What is the typical mid- career salary? <i>Answer:</i> \$60-100K	29% Most common was \$40-59K	78% Most common answer was correct answer	
	Weighted ave pre	Weighted ave post	
Teaching pays a lot less than other careers	0.67 (between "neutral" and "agree")	-0.39 (between "neutral" and "disagree")	
Teaching is a good career choice	0.37 (between "neutral" and "agree")	0.94 ("agree")	
I want to become a teacher	-0.71 (between "neutral" and "disagree") SD – 32.5% D – 28.9% N – 17.7% (290) A – 9.5% (155) SA – 8% (131) DK – 3.4% (56) 1638 286 agrees	-0.33 ("between "neutral" and "disagree") SD – 19.5% D – 26.7% N – 26.7% (437) A – 13.5% (220) SA – 10.2% (167) DK 3.5% (24) 1640 387 agres	
		<ul><li>553 positive shifts.</li><li>116 large shifts (&gt;1)</li><li>101 more agrees</li><li>147 more neutrals</li></ul>	





### **Across faculty**



N of responses: 892 change agent (658 complete), 213 toolkit (143 complete) 23% physics, 19% chemistry, 20% math, 3% engineering, 7% other STEM, 18% other education, 11% other – change agents. Similar for toolkit. Wendy Adams' presentations have higher percent of correct answers post. But similar attitude. Change agent median: 75%, 73% mean Change agents, no Wendy: 75% median, 69% mean Wendy Adams median: 75%, 76% mean Toolkit median: 75%, 71% mean Median of all = 75%.

	Medi an	Mean
Toolkit	75%	71%
Change Agents other than Wendy Adams	75%	69%
Wendy Adams	75%	76%

#### **Post-test responses (% questions correct)**

#### Responses are for change agents but toolkit (TK) was similar except where noted

	% correct pre	% correct post
How do you think teachers rate their lives? <i>Answer:</i> <i>Near the top</i>	36% Most common was "middle of the pack"	78% (91% TK) Most common answer is correct answer.
What % of STEM students express interest in teaching <i>Answer: 40-60%</i>	14% Most common was "10-20%"	70% (82% TK) Most common answer is correct answer.
Do teachers have loan forgiveness Answer: Yes, and most qualify	48% Most common answer was correct answer	95% (85% TK) Most common answer was correct answer
What fraction remain in profession at year 5? Answer: 78%	22% Answers were distributed	65% Most common answer was correct answer

What is the average age of retirement <i>Answer: 59</i>	27% Answers were distributed	64% (44% TK) Most common answer was correct answer
What is the typical mid- career salary? <i>Answer:</i> \$60-100K	50% Answers were distributed between \$40-59 and 60-100	83% Most common answer was correct answer
What fraction of teachers have control over what they teach? <i>Answer: 90%</i> <i>or more</i>	10% Most common was 30-59%	50% Most common answer was correct answer
What fraction of teachers feel treated with respect? <i>Answer:</i> 87%	34% Answers were distributed	81% (72% TK) Most common answer was correct answer
	Weighted ave pre	Weighted ave post
I would be comfortable with my favorite student becoming a teacher	1.13 (1.3 toolkit) (between "agree" and "strongly agree")	1.5 Between agree and strongly agree
Teaching pays a lot less than most other careers	0.44 (0.21 toolkit) (between "neutral" and "agree")	-0.63 (-0.7 TK) Between neutral and disagree

Feedback questions re all between "neutral" and "agree" so partial fidelity. Same for TK.

## Society survey (AMTE results)

Summary:

• **Top line result:** The respondents in AMTE were much more aware of Get the Facts Out than the professional organizations surveyed in 2021. Awareness at 56% is promising, especially with 22 respondents offering GFO as a resource even before it was mentioned in the survey.

• This survey was the same as was used for the ACS, APS, and AAPT awareness study in 2021. We used the same coding for how participants moved through the survey. Free-response items were coded using very similar, but not identical, schemes as last year.

• The overall response rate of 19% was higher than previous surveys, though there were proportionally more respondents who did not complete the survey.

• In terms of demographics, the sample is heavily tenure-track faculty at 4-year universities. What makes it very different from the 2021 samples is the much larger proportion from education departments (61%) than disciplinary departments.

• In two free-response items about where to look for career path information and teaching career information, 11 and 22 respondents cited GFO specifically. They rarely mentioned AMTE as a source, but often cited NCTM and their state departments of education. As with the results from 2021, respondents often referred to their own experience or that of other professionals.

• The free-response items revealed a bit of a double meaning when it comes to career path advising. There is more general advising about what career paths are available or appealing, then specific advising (and sometimes advocating) to help students actually get jobs. This distinction may be useful in GFO communications.

• Respondents who were aware of GFO reported the AMTE newsletter, word of mouth, and conference events as the most common ways they had learned about GFO.

• The survey did act as a form of dissemination, itself, with 80% of unaware respondents saying they definitely or probably will visit the GFO website.

• Suggestions for dissemination included typical modes such as regular emails, presence at conferences, and social media campaigns. One participant suggested leveraging the AMTE affinity groups. Another suggested creating emails and videos specific to disciplines like mathematics.

	AMTE	ACS	APS / AAPT
Sample invited to take survey	990	4000	4609 APS 2308 AAPT
Respondents (% of sample)	187 (19%)	347 (9%)	488 (7%)
Did not finish (% of respondents)	50 (27%)	22 (6%)	37 (8%)
Completed surveys	137	325	451

Response rates from AMTE and previous society surveys

Completed survey and gave consent for IRB/research	117	259	327
--	-----	-----	-----

What is notable, here, is that the response rate is much higher in the AMTE sample than it was last year in the ACS, APS, AAPT surveys (6-9%). On the other hand, the completion rate for the other society surveys was higher. AMTE's completion rate might be lower due to the larger percentage knowing about GFO and thus getting more questions.

### **Demographic Information**

The table below contains information provided about the type of institution. The values are not notably different from last year's values, except that ACS had more K-12 instructors and AAPT had more instructors from 2-year colleges. Note that the table includes all who responded to this item—all respondents—and the total N will decrease as we proceed through the survey.

Which best describes your current institution?	Count	Percent
Four-year private college or university	30	16%
Four-year public college or university	134	72%
Government or National lab	1	1%
K-12 school	7	4%
Other (please specify)	5	3%
Retired from academia	7	4%
Two-year college	3	2%
Grand Total	187	100%

The table below contains information about the type of department to which the respondent belongs. Notably, the majority of respondents are from education departments. The physics and chemistry groups surveyed last year were so heavily in 'natural science' departments that we didn't bother to report it.

Which best represents your department or unit?	Count	Percent
Education	106	61%
Mathematics	57	33%
Natural sciences (e.g., physics, chemistry, biology, etc.)	1	1%
Other (please specify)	10	6%
Grand Total	174	100%

The table below contains information about the self-reported role of each respondent. These values seem similar to the other professional societies surveyed in 2021, though the AMTE respondents seem to have a higher proportion of graduate students.

Which best represents your current position?	Count	Percent
Emeritus faculty	4	2%
Full-time research faculty	3	2%
Graduate student	19	11%
Other (please specify)	5	3%
Part-time teaching faculty	4	2%
Postdoctoral scholar	3	2%
Teaching faculty	13	7%
Tenured or tenure-track faculty	121	70%
University staff	2	1%
Grand Total	174	100%

The table below contains responses indicating specific types of roles.

Do any of these roles currently apply to you?	Count	Percent
Department chair or head	11	6%
Faculty advisor	45	26%
More than one or other administrator (please specify)	24	14%
None of the above	88	51%
Undergraduate chair, associate chair, or equivalent	5	3%
Grand Total	173	100%

### **Awareness of GFO**

What is remarkable here is the large number of respondents who were aware of Get the Facts Out. More than half of respondents on this item reported being previously aware of GFO. Contrast that with 5-40% aware in the 2021 surveys of ACS, APS, and AAPT.

Have you heard of the<br/>Get the Facts Out project?I'm not sure6 (4%)No61 (40%)Yes84 (56%)Total151



### Have you heard of the Get the Facts Out Project? N (Percent of sample)

	AMTE	ACS	APS-Only	AAPT- Only	Both AAPT + APS	Total
Not sure	6 (4%)	13 (4%)	7 (5%)	3 (3%)	13 (7%)	42 (5%)
No	( ()	295 (91%)	136 (87%)	61 (69%)	103 (53%)	656 (70%)
	61 (40%)					
Yes		16 (5%)	13 (8%)	24 (24%)	77 (40%)	232 (25%)
	84 (56%)					
Total	151	324	156	88	193	930



Information on careers

Two questions ask about where respondents would find:

- 1. Career information
- 2. Information on K12 teaching careers

For Career Information (generally), the AMTE respondents often interpreted this as job placement, and so many responses from this teacher-centric audience still related to K12 teaching. Notably, GFO was mentioned 11 times by 10% of respondents before being mentioned explicitly.

For finding career information to mento undergraduates, (N=113 responses), most indicated that they relied on:

1. Colleagues and mentors (N=49). I.e., others in higher education.

2. **Experience of professionals** (N=37). I.e., themselves, alumni, teachers, and others with experience in the profession at hand.

3. **Other organizations** (N=31), i.e., state, federal, professional, or unions. It might be worth embedding GFO deeper or connect more explicitly with state departments of education. It is a place where AMTE members regularly turn for information.

4. **Other** (N=27), i.e., google searches, literature review, employment websites, job listings, and recruiters.

5. **Professional organizations** (N=24). I.e., NCTM, MAA, AMTE, etc. The respondents mentioned NCTM much more often than AMTE, despite the survey coming with an AMTE label. Does NCTM have more/better career resources than AMTE?

6. Campus resources (N=24). I.e., academic advising, career centers.

7. **Get the Facts Out** (N=11; 10% of respondents). Interestingly, while this question was about career advice *in general*, 11 people spontaneously mentioned GFO as a resource they would use.

For those who said they know where to look for information on K12 careers, they indicated where they would find this information. There were 4 text boxes, and respondents entered an average of 2.8 resources (this was higher than the other surveys, 1.8 responses). In order of popularity.

1. **Other organizations** (N= 78 respondents), these include state, federal, professional unions, school districts, NCTM and MAA. Many respondents mentioned more than one item in this code.

2. **Professionals** (N=28 respondents). In this case, K12 teachers are the professionals they would consult. Many respondents mentioned more than one item in this code.

3. **Campus resources** (N=20 respondents). These include schools of education, academic advising, teacher prep programs, and career centers.

4. Get the Facts Out (N=22 respondents). This represents a full 25% of the respondents. This item occurs before GFO is mentioned in the survey and is a very positive result.

5. **Other** (N=78 respondents). This includes Google searches, literature review, employment websites, job listings, recruiters, colleagues

6. **AMTE** (N=6 respondents). Much smaller than other societies.

Comparing to other societies:

- Respondents named many more resources than other societies.
- Many more mentioned GFO as a resource for careers (10% of respondents) and K12 teaching (25% of respondents) than did other societies except for AAPT (1% ACS, 17% APS, 21% AAPT).
- Many more mentioned other organizations ... included state, federal, professional, unions, school districts, NCTM, MAA)

Code	AMTE	ACS	All APS	All A A PT
Other Organizations	96%	37%	22%	23%
Professionals/teachers in K12*	35%	39%	25%	23%
<b>Campus resources / Educ. programs</b>	25%	66%	36%	33%
GFO	27%	1%	13%	15%
Other	25%	15%	6%	4%
AMTE, ACS, APS, AAPT	7%	15%	24%	28%

Percent of respondents mentioning this code at least once (for K12 careers)

PhysTEC	0%	2%	19%	22%
"We Do This Here" – Noyce, UTeach, etc.	5%	10%	12%	11%
Number of Respondents	81	154	250	228

\* Recoded from "K12 teachers" since it includes admin.

\*\* Campus Resources / education programs includes "we do this here" because many were in SOE. This includes Noyce, UTeach, DBEr faculty, dual major programs.

# Faculty Strategy Implementation (FSI) 2022 results

The Faculty Strategy Implementation (FSI) survey is appended to the end of the PTaP.HE to ascertain the degree to which GFO materials are used. In order to learn about Professor's responses to the FSI, we administered the survey directly to this group. We are not able to identify Professors individually within the broader responses to the PTaP.HE. We added some specific questions to the survey about gender, department, and whether the professors are tenured or not.

There were approximately 535 respondents that took part in at least one question of the FSI survey. The average amount of responses was around 500 for the earlier questions and decreased to around 50-100 responses per question.

- Spread across the 3 main disciplines fairly evenly, 24-32% of respondents in each.
- More female than male (60%)
- Most tenured or tenure track (70%)
- Most interact daily with students (85%)
- Most interact with graduate students weekly or daily (78%)



















Never and no plans to use in the future Never but plan to use in the future Once or twice Several times

## Data handouts and student presentations are the most commonly used on the FSI survey



"First conversations" is the same as "Take the next step"



Respondents were asked since learning about GFO if they have:

- 1. Looked up or examined local salary, retirement, and other benefit data for grade 7-12 teachers.
- 2. Looked up or examined local salary, retirement, and other benefit data for other careers students can get with the same degree.
- 3. Examined your own assumptions or perceptions of grade 7-12 teaching as a career
- 4. Created local versions of GFO resources or materials.
- 5. Spoken to faculty outside of your institution about GFO





