Chasteen Educational Consulting

Get the Facts Out: 2020 Annual Evaluation

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Table of Contents

Evaluation Questions

Get the Facts Out is at the end of its second year of activity, and this report summarizes the observed progress and open questions at this point in the grant. The evaluation focuses on whether the project is laying a solid foundation to achieve the expected change, and adapting appropriately as the project develops.

This annual review is guided by the following evaluation questions:

Are the project processes and products likely to lead to the successful achievement of the vision?

1. **Toolkit development:** Is the GFO Toolkit supportive of effective change?
2. **Campaigns**: To what degree does Get the Facts Out as a project have the potential to reach its intended national scale?
3. **Continuous improvement:** Is the project improving and evolving over time? What potential barriers has it successfully overcome, what challenges remain?

Data reviewed for this report include the following:

1. 2019 Annual Evaluation Report.
2. Project responses to evaluation feedback, including December 2019 Evaluation Audit.
3. 2020 Annual reports submitted by PIs and working groups.
4. Change Agent activity tracking forms
5. Website tracking statistics
6. GFO Workshop survey results

Executive Summary

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

The most substantive successes of the project this year are:

1. **The research and Toolkit materials are a shining strength of the project.** The Toolkit has been extensively developed based on user needs and research. The materials exemplify features of projects which are effectively disseminated, and uses effective persuasion techniques. The Toolkit and other resources have been an intensive focus, which is appropriate given their central importance.

2. **The design of the project around "Change Agents" is resulting in national reach**. A total of 59 outreach activities were reported by change agents, reaching approximately 1000 faculty, staff, and students; this represents a substantial increase over the 500 reached in Year 1 of the project. About one-third of the attendees reached are faculty, representing approximately 130 institutions. Physics in particular is on track to reach half of all physics departments during the 5-year project. Thus, the model of several change agents undertaking a few activities does result in broad reach.

3. **The engagement of several leading disciplinary societies leverages the resources and reach of these organizations**. The human resources, communication mechanisms, and coordination available to GFO would not be feasible without the society partners, who have contributed data mining assistance, website, design, project management, and targeted dissemination mechanisms within the discipline. The website has had over 10,000 unique pageviews since September (5000 for the home page), and a total of 430 material downloads. The email and Facebook page have over 200 members.

4. **Get the Facts Out is well-positioned to achieve the desired scale due to stakeholder engagement**. In the language of scaling science, scaling is more likely when partnerships and relationships are leveraged; "inclusive coordination." The engagement of change agents, disciplinary societies, and use of user-centered design all represent inclusive coordination. For the disciplinary societies this coordination is mostly top-down "directed coordination" – an agreed upon strategy and coordinated implementation of the project. For the emerging national network of change agents and champions, however, the coordination is more "undirected coordination"; emergent, organic and self-organizing.

5. **The project has engaged in significant continuous improvement of its approach**. The project has responded to feedback from the evaluation and other sources to create strategic planning, working groups, develop the website, develop a fidelity of implementation framework, conduct all-change-agent meetings, support local data mining, and create Toolkit materials which support the emerging needs.

The primary challenges of the project at this point are:

1. **Many conditions need to be met for the national reach to result in the desired change.** The project impact will not be met simply by reaching large numbers. Some additional conditions must be met:
    a. *The workshops and local campaigns are persuasive*, using the critical features of Get the Facts Out (i.e. fidelity of implementation). It is unclear the degree to which this is happening or that the critical features are guiding interventions.
    b. *The number of national, faculty-facing workshops are increased,* and reach a variety of institutions, to ensure the message is spread broadly to faculty. This is particularly important for Chemistry and Math.
    c. *The national campaigns are persuasive and inspire champion engagement*, allowing for repeated exposure to the messages of GFO and urging potential champions to take local action. The website has had visibility, for example, but traffic is not increasing as one would expect. The coordination of communication strategies for change agents and champions has proven difficult. It is unclear to what degree the national campaigns are achieving fidelity of implementation to critical features of the project. I am concerned whether national campaigns and change agent intervention is engaging champions adequately.

2. **The optimal scale required to achieve change requires some strategic thought.** How will adequate numbers of faculty be reached, and how will the right type of faculty be reached to actually result in broad spread of GFO messages? Is "number of faculty/students" reached the best measurement of project impact? What additional types of project impacts are most highly valued, and for which stakeholders? Would engaging fewer people potentially result in greater impacts due to the increased effectiveness of a few highly-engaged and trained change agents and/or champions? Or do the benefits of broad engagement outweigh the costs of time, resources, and diminished connection to those doing the work?

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

Rather than make recommendations for the project on how to address the critical challenges, I pose several questions. I use the "how might we…?" framework from user-centered design to help spark thinking from the project leadership. Many of these areas have been active topics of strategy and conversations in the project. In the body of this report I outline the evidence and findings leading to these recommendations.

Recommendations

1. TIME: How might we make time spent on the project most effective and manageable, for all involved?

- How might PI Adams' central role as project coordinator be lightened?
- How might the society partners find ways to spread the required time and developed expertise broadly among staff?
- How might additional support and guidance be given to Change Agents so that their engagement is most effective and national reach is obtained?

2. COMMUNICATION: How might project communications support better information-sharing among the right people?

- How might information in the project be best shared to generate collective action and understanding among change agents and PIs, given how rapidly the project is evolving? I observe that often people are unaware of where to find information or of new processes.
- How might coherent strategy be developed among societies and change agents (e.g. a national outreach plan) to provide adequate coverage (e.g. adequate reach of faculty across institutions) and avoid missed opportunities (like Teacher Appreciation Week).

3. PROFESSIONAL DEVELOPMENT: How might the right people get the expertise they need about implementing GFO effectively?

- How might change agents improve their skills? There are plans to introduce them to the Fidelity of Implementation; is this adequate? How might change agents learn more about what one another are doing and get feedback?
- How might champions learn effective implementation strategies and get feedback?

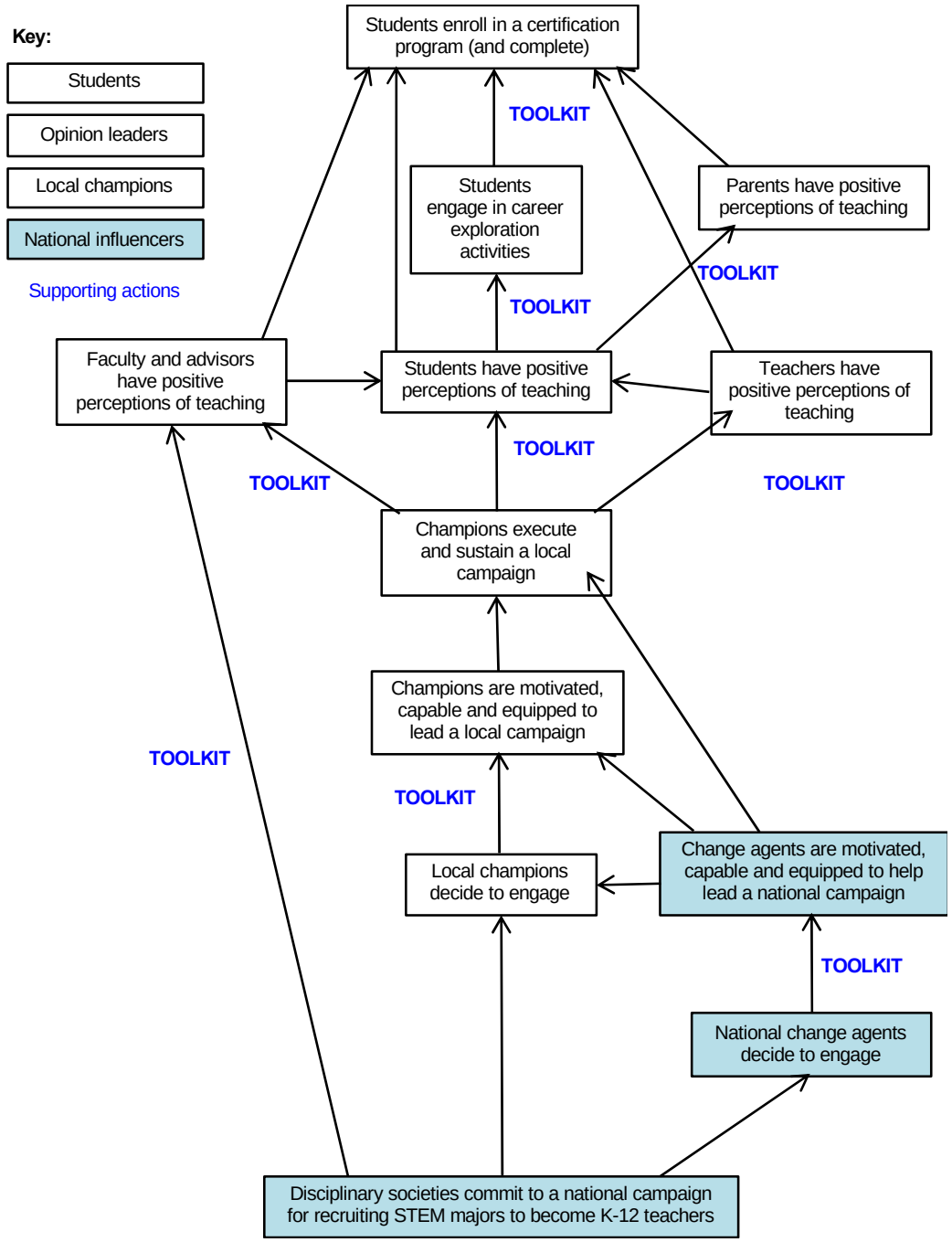
4. SCALING: How might the project define and achieve the desired scale?

- To what degree is GFO's inclusive coordination adequate to achieve scale? Is there more, or less, directed (top down) coordination required? For example, if advisors are a significant audience, should there be direct engagement with professional societies for advisors? How might more undirected (emergent) networks among local champions be developed? What might entice such energetic engagement and social networks?
- What types of project impacts are most highly valued, beyond reach of numbers (e.g. depth of engagement, apprentice models)? Does this vary by discipline?
- How might national campaigns ensure they are attending to critical elements of the persuasion (i.e. Fidelity of Implementation)?

Question 1: Toolkit development

Is the GFO Toolkit supportive of effective change?

Below I present the original Theory of Change for the GFO project, with all project interventions removed EXCEPT any mention of the **Toolkit** as a lever for change. This diagram communicates the central importance of the Toolkit materials at all levels of the project.



Finding: The Toolkit materials and design research are a shining strength of the project.

The Toolkit exemplifies features of successfully disseminated projects and of effective persuasion techniques.

In the last annual report, I reviewed the GFO approach compared to effective persuasion and dissemination approaches, using 3 theoretical frameworks. **I suggested that the project design was very well-suited to achieve broad impact** because it included the following elements (all of which are features of the Toolkit):

1. A focus on things that matter to faculty and students.
2. Addresses a clear need for teacher recruitment in a way that no other project is doing.
3. Easy to use, adaptable materials appropriate for broad messaging campaigns.
4. Embedded action steps for those exposed to GFO messages.
5. User-centered design based on research and user feedback.

These statements continue to hold true.

The Toolkit and resource materials have been an appropriate and intensive focus.

The project team has conscientiously, rapidly, and responsively evolved the Toolkit and associated materials, including:

- Collecting feedback from study sites.
- Engaging a video team
- Iterating the copy-write statements
- Extensive user testing

The Toolkit and resource materials targets user needs.

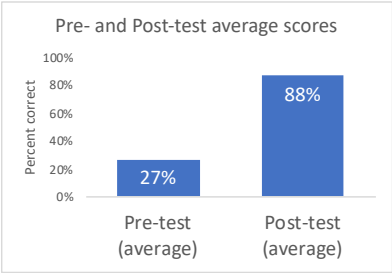
The Toolkit and research team have developed or refined materials to address user needs, including:

- Need for modifiable materials for local use
- Need for local data mining
- Need for student-facing website materials.
- Need for action items in qualitative site reports.
- Need for high-quality video products.

The faculty-facing workshop achieves significant change in knowledge and attitudes

We have instituted pre/post workshop surveys in order to measure gain. **In two recent workshops using the new surveys, we found impressive results**:

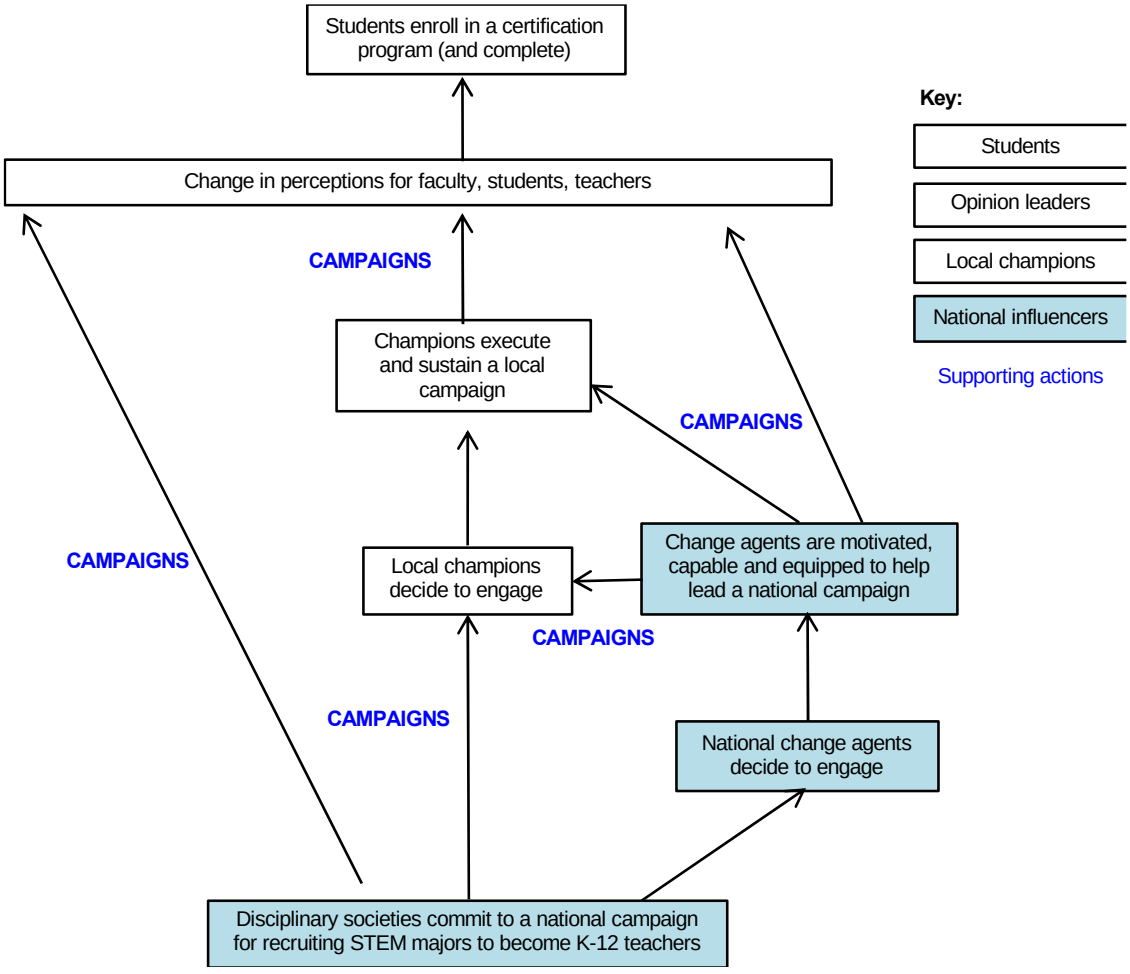
1. Normalized gains of 43% and 84% on 10 facts about the teaching profession, with effect sizes of 2.2 and 3.4, respectively (see Figure).
2. Increased endorsement of the statement "I would be comfortable with my favorite student becoming a K12 teacher."



Question 2: Campaigns

To what degree does Get the Facts Out as a project have the potential to reach its intended national scale?

Below is a portion of the Theory of Change with the influence of information and dissemination **campaigns** highlighted – led either by societies or the change agents. Effective Toolkit materials are only one step; the societies and change agents must also spread the message of the project to spark a national conversation.



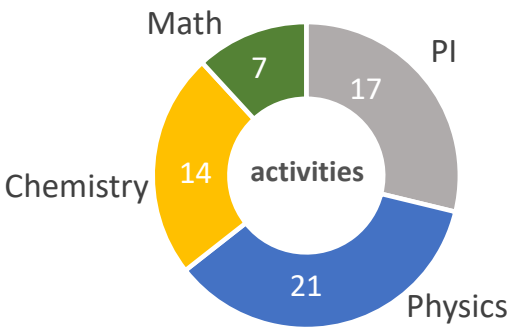
Below I outline the main outcomes of the national campaigns.

Faculty actors: Change agents and local champions

In this section I analyze the activities submitted by change agents. No data is available yet on local champions. Once the Faculty Strategies Implementation (FSI) survey is administered and analyzed this Summer, there will be more information on use by local champions at qualitative sites. Math presentations are included, but the MAA left the project partway through the year, and so these are not analyzed in detail.

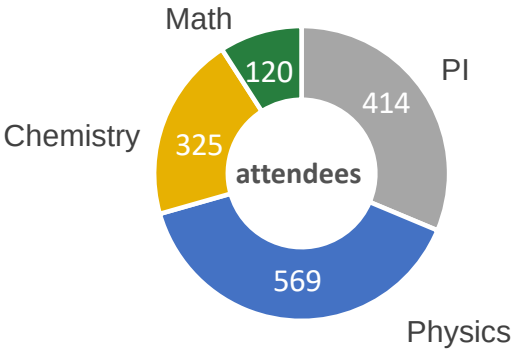
59 Total activities completed

3.5 Average workshops per change agent

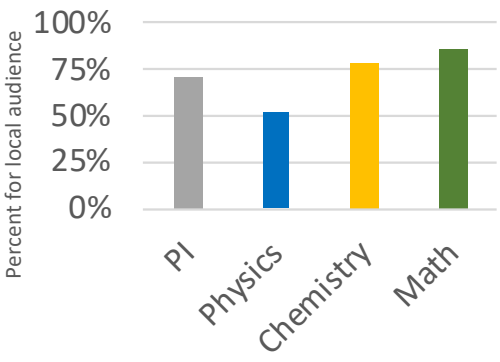


1378 Workshop attendees reached

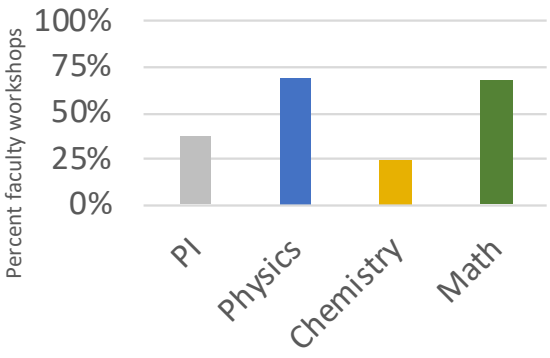
964 Attendees reached by change agents



73% Of activities were for local audiences



70% Of workshops aimed at faculty
But only 37% of attendees are faculty.



Physics and Chemistry have different approaches, with physics having more workshops, more national workshops, and more faculty-facing workshops.

"Activities" include workshops and other Toolkit use. "Workshops" include faculty or student presentations. Workshop attendees not in a change agent workshop were in a PI workshop (mostly for qualitative sites).

Finding: There is substantial project activity and reach.

Across the project, 59 activities (53 of which were workshops or presentations) were completed this year, reaching 1378 attendees– despite the COVID-19 shutdown and subsequent cancellation of multiple workshops. All but one change agent met their target of 2 workshops/year, reaching almost 1000 students, faculty, and staff. For comparison, in the first year of the project, 500 workshop attendees were reached. Out of these 1300 attendees, approximately 37%* (700) were faculty.

Are these activities achieving the expected reach? This is a difficult question to answer. I begin with the original dissemination goals. In the project proposal, the PIs estimated that the project reach about half of departments in higher education in each discipline, as follows (considering that Year 1 was changed to focus on local workshops):
5 change agents X **2** workshops X **10** faculty from different institutions per workshop
= **100** faculty per year X 4 years†
= **400** faculty from different institutions, per discipline, over the life of the project.

I estimate below the faculty reached from different institutions in Year 2.

	Target faculty from different institutions reached in Year 2	Approx faculty reached‡ in Year 2	Approx faculty from different institutions reached in Year 2
Physics	100	356	86
Chemistry	100	81	20
Math	100	81	25

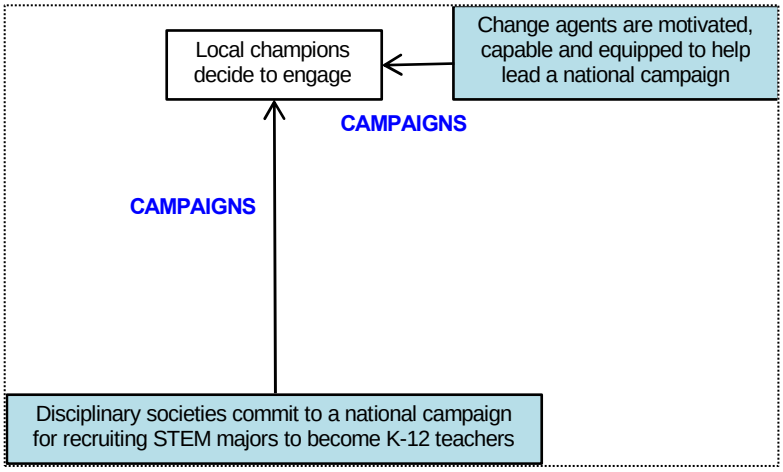
Thus, while each change agent's reach is modest, and some change agents are more engaged than others, in aggregate the reach is large due to the design of GFO. Chemistry and Math both reached at least 80 faculty, but due to the local focus within these disciplines the number of faculty from different institutions is likely ~20-25 in each of these disciplines. Chemistry focused primarily on local, student-facing workshops, and provided only 3 national workshops (an additional 3 were cancelled due to COVID-19). Physics conducted more national-facing workshops, and reached ~350 faculty, of which 80 faculty were likely from different institutions. Chemistry would need to modify their approach to reach the original target numbers, even given the 3 cancelled workshops. I would like to point out that Chemistry did include multiple change agents on the national efforts, supporting an apprentice and mentoring approach that is likely to support skill-building and self-efficacy; an approach not as apparent within other disciplines.

* Because workshops are often mixed-audience, but total attendees is only reported for the workshop as a whole, we cannot calculate exact proportion of students and faculty. Numbers in this section are thus estimates.
† The proposal used a time span of 5 years, but in Year 1 the project determined that change agents would focus primarily on local workshops in Year 1 to build skill and confidence.
‡ Faculty and institutions reached do not include the PI presentations to qualitative sites. Faculty reached are estimated based on the total attendees, and the description (e.g. primarily faculty/staff). Institutions reached are very roughly approximated based on the description of the workshop (e.g. a national workshop reaching 60 faculty might reach 20-30 institutions), whether the full GFO workshop was presented, and only includes faculty-facing workshops. Institutions may be double-counted.

I encourage the project and disciplines to consider desired goals and outcomes for each of their societies, in addition to the number reached (e.g. depth of impact, apprenticeship opportunities).

Concern: Local Champions decide to engage

In examining the Theory of Change on Page 9, we can see the critical role of campaigns in persuading local champions to engage and spread the messages of GFO:



I am unsure the degree to which the national campaigns and change agents are reaching this level of persuasion. If this engagement is not achieved, then even a broad national reach will not result in the desired impacts.

I tentatively conclude that the number of faculty reached by the change agents may be adequate to reach the desired national reach, *if* the following conditions are 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 and national campaigns include a bid for faculty to "get the facts out" as local champions, with direct and specific action steps.
5. The workshops are accompanied by strong national campaigns for repeated exposure to the messages of GFO.

National actors: Society outreach and campaigns

Finding: The societies have provided valuable central resources for the project. These have enhanced the reach and impact of the project. Such efforts include:

1. *Local data mining assistance.* GFO and PhysTEC sites are able to request assistance in identifying relevant local data to bolster their GFO presentations. This central human resource alleviates faculty burden in identifying this data – enhancing the persuasiveness of GFO presentations.
2. *Website hosting and design*. The website was redesigned to better support the emerging user needs in the project (including student-facing materials).
3. *Project management*. A variety of GFO project elements have been enhanced by project management, particularly at APS and AAPT, such as email list management, PI and working group meeting agendas and notes, among other things.

Finding: The society campaigns have included a variety of discipline-specific dissemination mechanisms. These dissemination mechanisms provide opportunities to reach multiple faculty and departments, and enhance visibility of the project.

1. *National and regional conferences.* The societies have organized workshops, invited speaker sessions, teacher lounges, and GFO-focused sessions at national and regional disciplinary conferences.
2. *National webinar.* ACS hosted a national webinar about GFO which engaged several change agents.
3. *Social media presence.* GFO hosts a Facebook group and Instagram page with posts about recent articles, GFO news, and upcoming events. GFO is included in society-based social media pushes as well.
4. *Website.* GFO links are included on society websites, and ACS launched an ACS-specific GFO site.
5. *Written articles*. Information has been disseminated through society publications, emails, and newsletters.
6. *GFO Forums.* While not yet active, email lists have been created for general information and each discipline. The disciplinary forums have been replaced with the Facebook group.
7. *GFO Newsletter.* Two bi-monthly newsletters have been sent to those on the GFO email list.
8. *Change Agent meetings*. The societies have semi-regular meetings with Change Agents to support sharing of information and plans.

These outreach efforts are impressive, and each represents a fair amount of effort. Some communication challenges are evident throughout these efforts, however. For example, it is difficult to find out the details of upcoming and past efforts across societies. The existence of two websites (at ACS and the main GFO page) creates some fracture across the project, as well as inconsistent language on the two sites. The email listservs are not yet functional, and Facebook groups are not generating conversation between new champions as hoped. Coherence and centralized strategy are still being developed. For example, Teacher Appreciation Week seems a missed opportunity for a coordinated GFO outreach campaign.

Finding: The website is garnering steady traffic, but this traffic is not increasing.

The GFO website has up to 800 page-views per week. Since September 1st, the home page has had 5,000 unique page views. The number of website sessions for unique users is approximately 600/month. The trend is fairly steady.

Thus, the website is a valuable resource, but the fact that page views are not steadily increasing over time may suggest a new strategy to drive people to the site is needed. Given the great attention devoted to developing the website, and the resources on it, this investment ought to be leveraged.

Finding: Recruiting resources and facts are getting the most traffic.

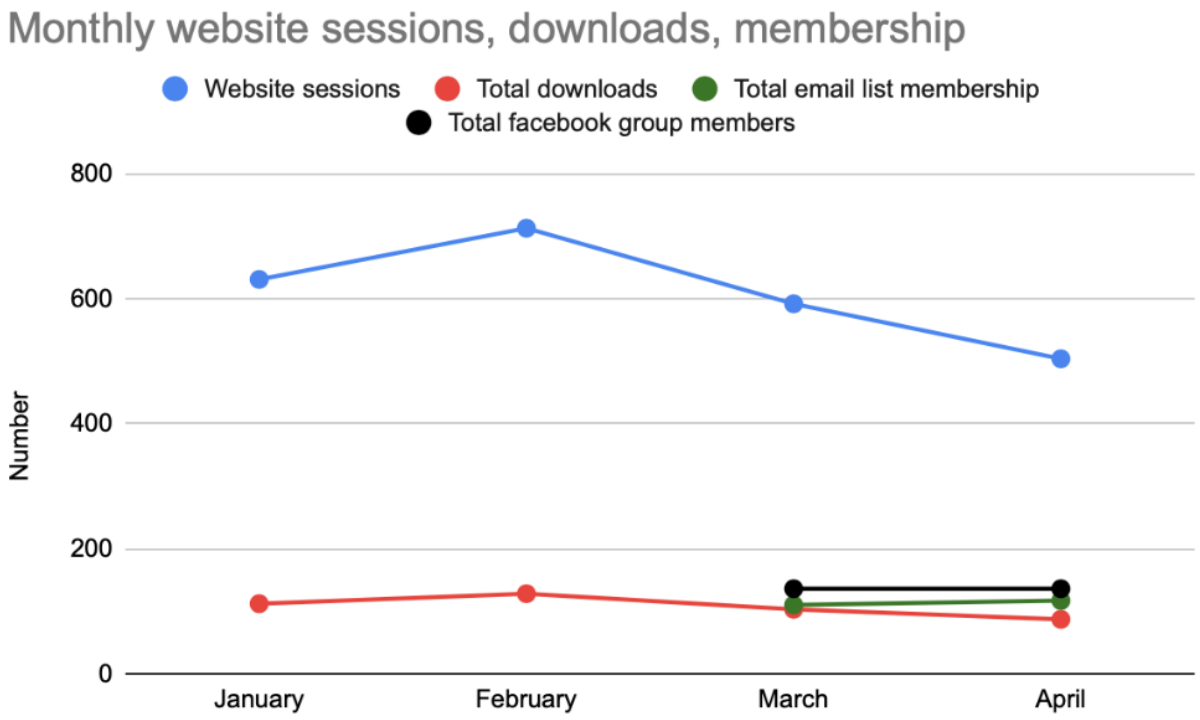
The most popular pages are /recruiting-resources and /facts-and-data. The new /how-become-teacher is also among the top pages, demonstrating that this does fill a user need, as is the /in-your-region. Presentation materials also capture many page views. Below are statistics since September 1, 2019.

	Page	Pageviews	Unique Pageviews
		15,199 % of Total: 100.00% (15,199)	10,589 % of Total: 100.00% (10,589)
1.	/	**4,415** (29.05%)	3,315 (31.31%)
2.	/recruiting-resources	**1,710** (11.25%)	1,008 (9.52%)
3.	/facts-and-data	**1,263** (8.31%)	857 (8.09%)
4.	/facts-and-data/myth-1-teaching-pays-less	**641** (4.22%)	534 (5.04%)
5.	/in-your-region	**464** (3.05%)	293 (2.77%)
6.	/how-become-teacher	**450** (2.96%)	283 (2.67%)
7.	/recruiting-resources/presentation-students	**412** (2.71%)	300 (2.83%)
8.	/recruiting-resources/brochure	**403** (2.65%)	216 (2.04%)
9.	/about	**368** (2.42%)	235 (2.22%)
10.	/recruiting-resources/poster	**353** (2.32%)	208 (1.96%)

Data on this page are from the monthly reports from the web team (whereas the ones on the previous page are from Google Analytics).

Finding: Website sessions far exceed downloads or list membership.

The graphic below shows that only a small fraction of website sessions is associated with downloading materials. Cumulatively, there have been 2440 website sessions since January 2020, but 430 total downloads. Since the materials are a significant deliverable of the project, this may be cause for concern.



Finding: The number of downloads per month is similar to email list membership.

The email list membership is reassuringly similar to the estimated number of users downloading materials (100-200 users generating 430 downloads). Cumulatively, the Facebook and email list membership is a total of 253 non-unique members. Thus, the email and Facebook lists may include a significant portion of those who are downloading and using the materials. Note that downloads are on a per-month basis, whereas list membership is static:

Discussion: Scaling science

I consider the findings above through the lens of Scaling Science, using in particular a short article by Gargani and McClean (2017): https://ssir.org/articles/entry/scaling_science. Scaling science examines how to scale up social impact for public good. They develop four principles for scaling science, and I examine two here.

Guiding Principle: Inclusive Coordination

In order to achieve scale, innovators must develop relationships with key stakeholders. From Gargani and McLean:

> *Innovators must develop relationships with those affected by the innovation and those that make scale possible. Most of the time, it is beyond the capacity of a single innovator or organization to substantially improve a social or environmental problem, no matter how bold its scaling objectives. Scaling impact depends on the partnership, collaboration, inclusion, and competition of many actors. The practical challenge that innovators face is how to coordinate the actions of diverse actors with multiple agendas and perspectives in a way that advances the public good.*

Get the Facts Out uses "inclusive coordination" at its' heart, engaging faculty champions, society leaders, and soliciting feedback from the students, teachers, and faculty it aims to reach. But as noted in the text above, this is not without its challenges – as GFO has found.

At the society level, the various actors are coordinated using **"directed coordination,"** where there is an agreed upon strategy and coordinated implementation (e.g., engagement of change agents and strategic communications with members.) By comparison, the efforts of local champions and faculty could be said to be **"undirected"** – the systems and networks are organic and somewhat self-organizing, though under the coordination of the national strategies such as Facebook and email lists.

Questions for consideration: Inclusive coordination
To what degree is GFO's inclusive coordination adequate to achieve scale? Is there more, or less, directed (top down) coordination required? How might more undirected (emergent) networks be given space to develop?

Guiding Principle: Optimal Scale?

In order to reach solutions to societal problems innovators must find an "optimal scale" which may not be the maximum scale due to trade-offs. Often an intermediate scale is more desirable. From Gargani and McLean:

> *Understanding optimal scale starts with creating clarity about what exactly impact at scale is and how it will be measured. … (Outcomes beyond beneficiary counts) such as improvements to a program's accessibility for particularly underserved subpopulations or cost-efficiency gains, can greatly increase the overall impact of a program. At the*

same time, qualitative aims such as sustainability or satisfaction can also deeply improve people's lives. After all, it is entirely plausible that benefit for a population can be greater from doing very well on a small scale than doing less well on a large scale—and of course, vice versa. …. Scaling may degrade positive impacts (diminishing returns), amplify negative impacts, and displace more effective alternatives. The way in which impacts change with scale—for better and worse, in linear and nonlinear ways, qualitatively and quantitatively—can mean the difference between success and failure.

Get the Facts Out is aiming to achieve change at a large national scale by creating a large and interconnected network of faculty change agents and champions across three disciplines. This may not be the maximum scale, but it is close. The project would benefit from considering, at this juncture, whether this maximum scale is actually the optimal scale.

Questions for consideration: Optimal scale

Is "number of faculty/students" reached the best measurement of project impact? What types of project impacts are most highly valued, and for which stakeholders? Would engaging fewer people potentially result in greater impacts due to the increased effectiveness of a few highly-engaged and trained agents? Or do the benefits of broad engagement outweigh the costs of time, resources, and diminished connection to those doing the work?

Question 3: Continuous improvement

Is the project improving and evolving over time?

In the 2019 annual report the evaluator made the following recommendations to the project. These recommendations were intended to help the project achieve greater, longer-lasting impacts on the number and quality of future STEM teachers. Below are the recommendations, the modifications that the project undertook in the past year to address them, and the remaining perceived challenges.

Finding: In general the project is showing attention to emergent issues, and continuously improving its approach. Lingering concerns remain in terms of over-commitment, streamlined communication, and project reach.

1. Strategy	*Recommendation: Use strong, flexible leadership to support collective action. Leadership is a strength, but additional structures, such as an annual Strategic Plan, operationalizing the project vision, avoiding scope creep, and balancing the project research and process, will be helpful.*

Project response:

- Created working group structures, including Project Planning.
- Created an annual Strategic Plan and Timeline approved by PIs.
- PI Adams attends carefully to project management and research.

Continuing concerns:

- The project continues to take on more than anticipated, based on newly identified needs in the communities it serves.
- Considerable time investment is required from PI to attend to communication and scope.

2. Communication	*Recommendation: While communication processes are being placed, I suggest a working group focused on strategic communication across the project as a whole (including horizontal and vertical communication) which ensures easy sharing without overload.*

Project response:

- Created a Communications working group tasked with creating a communication plan.
- Conducted All Change Agent meetings to share information about project developments.

Continuing concerns:

- The Communications group has not yet developed strategy or guidelines for communication with different stakeholders.
- Sharing of strategies among change agents and champions is not occurring regularly and there is not a clear plan to formalize this sharing.

3. Propagation	*Recommendation: Based on the research on persuasion, effective dissemination, and behavior change, several recommendations are made to further support the adoption of GFO-relevant attitudes and practices – such as creating a propagation plan, focusing on the impact on students, clearly*

	suggesting action steps, ensuring active data processing by participants, and scaffolding effective campaigns.

Project response:

- The website was successfully modified to be potentially more effective, including a portal for students.
- Using research on persuasion and behavior change to develop Toolkit materials.
- Developed Fidelity of Implementation framework to clarify the actions presenters should take in workshops to ensure persuasion.
- Conducted series of All Change Agent meetings to share effective propagation strategies.
- Qualitative Site Reports include suggested action steps for those sites

Concerns:

- It is unclear to what degree the Society Campaigns are coherent and using principles of effective persuasion.
- It is unclear whether the project will accomplish projected national reach to a large number of departments (especially with Covid-19).
- Additional scaffolding may be required for local champions to undertake GFO work; this will be at least initiated with change agent professional development in August.

4. Feedback	*Recommendation: With many stakeholders arises much feedback. To ensure a user-centered design, curating and interpreting this feedback and its' impact for action steps for the project. I recommend sifting this feedback out to the working groups.*

Project response:

- Compiled all feedback across the project in Summer 2019 and used it to further develop the Toolkit and inform working groups.
- Feedback from site visits has also informed the project on a rolling basis.
- Items for discussion are often brought to the PI meetings.

Concerns:

- Non-immediate action items from feedback do not have an obvious home (e.g. "parking lot" to be revisited later).

5. Data	*Recommendation: Use the new Toolkit working group to carefully curate the career data that is collected, including providing norms for high-quality valid data which can be used and creating high-quality visualizations to enable cognitive processing.*

Project response:

- There is a formal plan for local data mining by the project, to support generation of high-quality accessible data
- Toolkit and Research working groups have generated high quality visuals for toolkit materials and research products, with attention to clarity and results from user-testing.

Concerns:

- None.

Summary: Strengths and challenges

Based on this annual review, I identify the following areas to celebrate, and for continued focus.

Strength	Challenge
Toolkit: High quality, extensively researched materials designed for user needs, along with local data mining and quality visuals.	**Toolkit:** User-centered design takes a lot of time, potentially overwhelming research team and PI Adams.
Research: Research on perceptions has heavily guided the Toolkit and project design, including influential survey instruments.	**Research**: None identified, except the time required and thus challenge of PI Adams' ability to attend to other project strands.
Society engagement: Enables collective action across STEM disciplines, led by respected organizations, with opportunity for systemic impact and cross-disciplinary information sharing.	**Society engagement:** It is challenging to establish consistent strategy and streamlined communication, especially with the high-level stature of society PIs. The society campaigns and change agent support require more attention than may have been anticipated.
Communication & leadership: Created working group structures and decision-making structures. All Change Agent meetings are productive. Monthly updates are shared.	**Communication & leadership:** As yet, a clear communication strategy has not been developed, and much information sharing relies on PI Adams as a central go-between on the project.
National campaigns: Establishment of Fidelity of Implementation features helps communicate critical elements across the project. Newsletter and website are functional and well-designed.	**National campaigns**: The national communication efforts are slow to establish, including website traffic and social media and listserv engagement. The level of coordination and common elements isn't yet clear.
Scaling: Relevant stakeholders are engaged through inclusive coordination, and this has potential to reach large numbers of faculty and students.	**Scaling:** Coordination of stakeholders is challenging; should it be more or less directed? For who? In addition to reaching large numbers, what other types of scales are desired?

Recommendations

Rather than make recommendations for the project on how to address the critical challenges, I pose several questions. I use the "how might we…?" framework to spark thinking. Many of these areas have been active topics of strategy and conversations in the project. In the body of this report I outline the evidence and findings leading to these recommendations.

1. TIME: How might we make time spent on the project most effective and manageable, for all involved?

- How might PI Adams' central role as project coordinator be lightened?
- How might the society partners find ways to spread the required time and developed expertise broadly among staff?
- How might additional support and guidance be given to Change Agents so that their engagement is most effective and national reach is obtained?

2. COMMUNICATION: How might project communications support information-sharing among the right people?

- How might information in the project be best shared to generate collective action and understanding among change agents and PIs, given how rapidly the project is evolving? I observe that often people are unaware of where to find information or of new processes.
- How might coherent strategy be developed among societies and change agents (e.g. a national outreach plan) to provide adequate coverage (e.g. adequate reach of faculty across institutions) and avoid missed opportunities (like Teacher Appreciation Week).

3. PROFESSIONAL DEVELOPMENT: How might the right people get the expertise they need about implementing GFO effectively?

- How might change agents improve their skills? There are plans to introduce them to the Fidelity of Implementation; is this adequate? How might change agents learn more about what one another are doing and get feedback?
- How might champions learn effective implementation strategies and get feedback?

4. SCALING: How might the project define and achieve the desired scale?

- To what degree is GFO's inclusive coordination adequate to achieve scale? Is there more, or less, directed (top down) coordination required? For example, if advisors are a significant audience, should there be direct engagement with professional societies for advisors? How might more undirected (emergent) networks among local champions be developed? What might entice such energetic engagement and social networks?
- What types of project impacts are most highly valued, beyond reach of numbers (e.g. depth of engagement, apprentice models)? Does this vary by discipline?
- How might national campaigns ensure they are attending to critical elements of the persuasion (i.e. Fidelity of Implementation)?