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Training the Trainers: Preparing Facilitators to Provide Professional Development for Engineers and Scientists

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Training the Trainers: Preparing Facilitators to Provide Professional Development for Engineers and Scientists

Abstract

This paper describes the development of a facilitator training program that prepares volunteers to offer interactive workshops to build professional skills. This effort to "train the trainers" is part of the CyberAmbassadors workforce development project funded by the National Science Foundation (NSF). The overarching goal of the CyberAmbassadors project is to develop professional skills training that helps participants collaborate more effectively in interdisciplinary settings. The core curriculum for participants includes 20+ hours of materials and activities to build communications, teamwork, and leadership skills. The "train the trainers" project described here is a complementary effort to prepare STEM professionals to facilitate these CyberAmbassadors professional skills trainings for their own workplaces and communities.

The facilitator training program was developed and tested with two cohorts, totaling more than 50 participants. Over the course of two days of in-person training, new facilitators had opportunities to experience the core curriculum as participants; to practice facilitation skills and lead group activities; to discuss practical and logistical aspects of offering training in their own communities; and to become familiar with the underlying pedagogy, learning goals, and modular structure of the professional skills curriculum. Surveys were used to collect feedback and evaluate participants' satisfaction with the CyberAmbassadors professional skills curriculum; their self-assessment of facilitation and professional skills before and after the training; and feedback on the facilitator training experience.

Responses from the first cohort of participants were used to refine the facilitator training program and it was offered to a second group of volunteers six months later. In the intervening time, several facilitators from the first cohort implemented CyberAmbassadors trainings at academic institutions, professional conferences, and industry workplaces. Participant surveys were used to provide feedback to the volunteer facilitators and to assist the project coordinators in identifying areas where additional training or support might be helpful. These lessons were used to improve the facilitator training program for the second cohort, and we recruited some of the original volunteers to help lead the second "train the trainers" experience. This approach both provides newer facilitators with additional experience and expands the number of individuals who can "train the trainers" and help to propagate the program for future participants.

In addition to describing the experiences and results from this "train the trainers" effort, this paper details the information, planning tools, and supports that are incorporated throughout the CyberAmbassadors professional skills curriculum materials to assist facilitators in offering these trainings. Lessons learned from this project can be adapted to other professional education efforts, both in terms of preparing new instructors and in helping trained facilitators better understand and meet the needs of their audience.

Background and Related Work: The Importance of Professional Skills

The National Academies have long emphasized the importance of developing strong professional skills in the modern workforce [1]. Learning to communicate effectively, work in teams, solve problems collaboratively, and make decisions by building consensus are essential skills for personal and professional success [2], [3]. These intrapersonal skills are particularly important in interdisciplinary contexts, where solving problems often requires gathering input from and coordinating the efforts of individuals with disparate backgrounds, experiences, and skillsets. For example, the selection criteria for National Academies Fellowship programs include disciplinary expertise, as well as the ability to communicate effectively with broad audiences; experiences in interdisciplinary collaborations; and the interpersonal skills necessary to help ensure that teams of all sizes accomplish their goals [4], [5]. The National Science Foundation also emphasizes the importance of this type of multi- and interdisciplinary approach to leverage innovations in science, engineering and technology to improve the human condition [6].

Providing training to improve professional skills like communication, teamwork, and leadership can improve individual and group performance in a variety of contexts. For example, research has demonstrated that helping healthcare providers improve their communication and teamwork skills can lead to better teamwork [7], [8] and improved patient outcomes [9]. In engineering, strong social and collaborative skills are critical for understanding and solving complex problems in the workplace [10], [11]. Supporting the development of strong communication and mentoring skills in the classroom and research lab has proven to be an effective approach for broadening participation and encouraging persistence among diverse students in STEM (science, technology, engineering, math) [12], [13].

In order to foster the development of strong professional skills in STEM classrooms and workplaces, we need to "train the trainers" (TTT) to provide instruction in professional skills, offer opportunities to practice, and support the individual and team growth. TTT programs have long been used in healthcare, commonly by developing a centralized effort to train individuals who can then return to their communities and share what they learned [14]–[18]. Similar approaches have been used to equip volunteers to offer "short courses" or specialized workshops to help participants upskill in emerging areas like bioinformatics [19], to improve engineering education [20], and to learn to offer peer-to-peer support to improve health outcomes [21].

Our Approach: Train the Trainers

This paper describes the development of a "train the trainers" program to prepare volunteers to facilitate interactive workshops that help participants build professional skills. This effort is part of a larger workforce development project (CyberAmbassadors) funded by the National Science Foundation (NSF) [22]–[24]. The overarching goal of the CyberAmbassadors project is to develop professional skills training that helps participants collaborate more effectively in interdisciplinary settings, with a primary focus on STEM professionals. The core CyberAmbassadors curriculum for participants includes more than 20 hours of materials and activities to build communications, teamwork, and leadership skills. The "train the trainers" project described here is a complementary effort to prepare STEM professionals to facilitate these CyberAmbassadors trainings for their own workplaces and communities.

In order to develop a TTT program to prepare facilitators, we needed to first understand the key characteristics of successful facilitation. While "facilitator" is sometimes used to describe someone serving as an "instructor" or "lecturer," in the context of this work we defined facilitation as a more supportive, collaborative role. Rather than being the "sage on the stage" we invited our volunteers to take on the role of "guide on the side," supporting participants as they build professional skills through discussion and rehearsal activities. Our TTT program takes a constructivist approach by immersing volunteers in the underlying curriculum and offering multiple opportunities for them to practice facilitation skills [25].

The TTT process we developed has several steps: (1) experience the curriculum as a participant; (2) build facilitation skills by participating in a TTT workshop; (3) work collaboratively to develop customized training for audiences in their workplace or community; (4) organize and deliver trainings, alone or with a co-facilitator, and receive feedback and mentoring to improve facilitation skills. This approach is inspired by similar efforts to prepare instructors from the life sciences to deliver technical training in data science [26], [27], as well as a highly successful facilitator training program offered by CIMER, the Center for the Improvement of Mentored Experiences in Research. CIMER offers workshops that allow volunteer facilitators to "become familiar with the curricula, practice facilitating training components, and develop a plan for implementing the training at their institution or organization" [28].

Effective facilitation requires numerous interpersonal skills, and to achieve excellence new facilitators require practice and feedback [29]–[33]. The goal of our TTT effort is to help participants develop the facilitation and management skills needed to understand and address the needs of different learners; to communicate effectively and listen actively in dynamic settings; and to foster an environment of mutual support and engagement where participants are encouraged to practice new skills. While mastery of these facilitation skills takes time, we developed shorter-term learning goals for the TTT workshop. More specifically, by the end of the TTT experience we wanted participants to have the knowledge and skills to:

- Share the history, objectives and structure of the CyberAmbassadors program
- Navigate the CyberAmbassadors professional skills curriculum and materials
- Develop agendas for their own trainings, using the CyberAmbassadors curriculum
- Organize, facilitate, and evaluate professional skills trainings
- Facilitate small and large group activities during professional skills trainings
- Contribute to ongoing development activities of the facilitator community for this CyberAmbassadors program

In signing up for the TTT experience, our participants agreed to use what they learned to plan and facilitate at least 4 hours of professional skills training using the CyberAmbassadors curriculum for local audiences. For example, two TTT participants from the same workplace adapted a module about teamwork and meeting management to create a training program for their colleagues [24]. Another TTT alumnus scheduled a 9-week "Lunch and Learn" series for staff at a federally-funded research facility, who were able to earn a certificate for completing the entire program. To help prepare new facilitators to organize and deliver successful trainings in their own communities, the TTT program included substantial time to explore the curriculum materials, practice with the facilitation guides, and work with planning and implementation tools.

TTT Program Structure

The facilitator training program was developed and tested with two cohorts, totaling more than 50 participants. Over the course of two days of in-person training, new facilitators had opportunities to experience the core curriculum as participants; to practice facilitation skills and lead group activities; to discuss practical and logistical aspects of offering training in their own communities; and to become familiar with the underlying pedagogy, learning goals, and modular structure of the professional skills curriculum. Surveys were used to collect feedback and evaluate participants' satisfaction with the professional skills curriculum; their self-assessment of facilitation and professional skills before and after the training; and feedback on the facilitator training experience. Data from the first TTT workshop was used to refine the agenda and experience for the second cohort; however, all of the topics and content described here were included in both TTT workshops.

During the two days of facilitator training, participants experienced about 6 hours of curriculum from the professional skills training program. While there are more than 20 hours of training in the full curriculum, our goal was to have the new facilitators experience a selection of core content. This included 2 hours and 45 minutes from the Communications modules; 1 hour and 15 minutes from the Teamwork section; and 2 hours from the Leadership training materials. This engagement with the curriculum was integrated with discussions about program logistics and opportunities to learn and practice facilitation skills, as described in the following sections.

TTT Program Content: Logistics

Table 1 summarizes the activities and topics that were covered during the TTT program related to the logistics of organizing and delivering professional skills trainings. The curriculum includes a variety of activities, case studies, worksheets, videos, and role playing scenarios – many with multiple variations designed for different audiences (e.g., college students or working professionals); for different delivery formats (in person or online); and for different time constraints (from a single activity to a multi-day workshop).

Table 1: Activities and Learning Goals Related to Logistics

Activity / Topic	Learning Goals
Introduce Agenda Template	Learn how to use the agenda template to create custom trainings
Introduce Facilitator Manual	Learn about the facilitator manual
Introduce Slide Deck	Learn about slide deck of curriculum materials
Introduce Session Planning Document (for communicating with hosts)	Learn about session planning resources
Introduce Training Implementation Planning Worksheet	Begin planning to host their own training
Introduce Evaluations	Learn about the program evaluation resources
Discuss Next Steps	Learn about expectations for planning and facilitating workshops; learn about ongoing facilitator training and support resources

The facilitator materials include detailed explanations about the structure and function of different examples and activities; offer suggestions for how facilitators can customize the materials without compromising the learning goals; and explain the rationale for why the curriculum was designed in specific ways. For example, consider a common ice breaker that asks participants to share three statements about themselves, two of which are true and one that is not. Within this professional skills curriculum, we choose to call this activity "Three Things" – even though in other contexts this activity is known as "Two Truths and a Lie." The facilitation guide includes the following explanation for this decision:

> **FACILITATION NOTES:**
>
> - This activity is also called "Two Truths and a Lie"
> - We use the "Three Things" activity name on purpose: the idea of lying (even for an icebreaker) makes some participants uncomfortable
> - It's important to have participants write down their statements so that they can say them the same way each time; otherwise, it becomes difficult (or easy) to identify the lie

Many of the participants in our TTT workshop had prior experience facilitating other types of trainings, and were familiar with "Two Truths and a Lie," which is a more descriptive name for the activity. Without this explanation of why we chose to use "Three Things" instead, facilitators might understandably opt for the more familiar title. That can create a less comfortable environment for some participants, particularly when working with multi-national and multi-cultural groups, since expectations and values about truth telling can be deeply ingrained.

Another example of how the facilitator materials support logistical decisions comes from a module on communicating about complex topics, which introduces two separate approaches for acting as the "Speaker" and "Listener" in a conversation. There are different rehearsal scenarios for Speakers and Listeners, giving participants the opportunity to try each approach during the training. These rehearsals are fairly lengthy activities, and when time is limited it is natural to think about combining or skipping some of this small group work. The facilitation guide offers specific suggestions for how to achieve the learning goals in various timeframes, and explains the rationale for keeping the "Speaker" and "Listener" scenarios separate:

> **FACILITATION NOTES:**
>
> - Practicing the Speaker and Listener tools separately is the preferred method, as it allows participants to focus on one area at a time. It also reduces confusion about which "tools" are being used in a specific scenario.
> - Participants often ask why we don't use Speaker and Listener tools together in the same scenario; the reason is that doing so doesn't really give opportunities to practice these skills independently.
> - While it would be ideal for both parties in a conversation to use Speaker and Listener tools alternately to communicate more effectively, in reality one party is often more skilled at Speaking/Listening than the other person.

TTT Program Content: Facilitation Skills

Table 2 summarizes the types of activities included within the TTT program to help participants develop and strengthen their facilitation skills.

Table 2: Activities and Learning Goals Related to Facilitation Skills

Activity / Topic	Facilitation Skills
Case Study Discussions	Practice facilitating small group discussions
Case Study Debriefs	Practice facilitating large group discussions
Reviewing Curriculum Materials	Practice facilitating Think-Pair-Share activities; practice selecting and evaluating materials for specific audiences, delivery mechanisms, and time constraints
Welcome (Back) / Recap of Previous Training	Discuss how to resume training after a break; explore how to organize a training based on topic, energy, time of day, meals, etc.
Anticipating Challenges	Discuss facilitation strategies for responding to questions; managing strong personalities; adjusting the agenda in real time; handling the unexpected, etc.

Most of our TTT participants had some experience with facilitating non-technical content before participating in our program, and many also had more traditional experience in classroom teaching or technical training. The focus of this TTT program was on facilitating highly interactive materials that include a variety of small and large group activities. Participants spent time practicing facilitation skills in different contexts, including working with case studies in small groups and leading a large group in a debriefing conversation. We also discussed strategies for managing time and energy during the training, like varying the type of activity; encouraging participants to move (while acknowledging that some may have visible or invisible limitations on mobility); when to include breaks; how to keep trainings on time – and when it may be valuable to adjust the agenda to accommodate participants' interests and engagement.

We also spent considerable time talking about how to select and evaluate new training materials. While the curriculum is extensive and includes numerous variations, facilitators are allowed and encouraged to adapt the materials for different purposes. During our TTT program, we got many suggestions from participants about other videos, activities, or resources that might be added to or swapped for existing curricula. In reviewing these suggestions, we encouraged participants to practice critiquing content to determine whether including it would enhance or detract from the training:

- **How accessible is this material?** Elements to consider include the availability of subtitles; the contrast between text and background colors; and presenting key information in multiple formats (audio, text, graphs, images, etc.).
- **How well does this material "match" the existing curriculum?** Elements to consider include whether content is being described in consistent terms; and whether the material is well-aligned with the interests and backgrounds of the audience.

- **How would this material enhance the training?** Elements to consider include the variety of activities or learning experiences (e.g., listening, reading, discussing, implementing); and whether the new material might effectively address time or resource constraints (e.g., a well-crafted, short video might explain a concept more succinctly than a longer discussion using multiple slides).
- **Does this material reflect well on the overall curriculum, particularly in terms of diversity, equity and inclusion (DEI)?**

Asking participants to evaluate materials with a "DEI lens" helped to identify items that, on the surface, seemed well-aligned with the goals of the training – but upon closer examination included unconscious biases or embedded stereotypes. For example, we showed participants an animated video that we had chosen not to include in the curriculum, and asked them to figure out why. At first, this video seemed to embrace DEI values: the characters were visibly different in age, gender, skin tone, mobility, and ethnicity. However, subsequent scenes revealed unconscious biases and stereotypes. One scene described conflict within a team by showing two male characters engaging in pleasant conversation – while a Black female teammate was depicted as so angry she was literally on fire. In other scenes, supervisors were repeatedly drawn as older men from majority populations wearing suits and ties; in contrast, their subordinates were typically more casually dressed, younger, and from minoritized groups. Analyzing this video with a "DEI Lens" highlighted the embedded stereotypes and biases, and sparked considerable conversation among TTT participants. Many reflected that they had not previously tried to analyze potential training materials in this way – often, they did a quick search for a specific topic and picked the first resource that matched the content and fit the time constraints. In this case, the problematic video was well made with a clear, succinct description of the topic, built in subtitles, and engaging animation. It might have been easy to overlook the embedded biases – particularly when facilitators are in a hurry and skim the subtitles or increase the playback speed instead of taking the time to carefully evaluate the full content.

TTT Program Evaluation

The TTT program was offered twice on the campus of Michigan State University, a large research institution in the midwestern United States. The TTT program was designed, implemented, and evaluated by the same team that created the underlying professional skills training for the CyberAmbassadors project [34]. Post-training surveys were administered to evaluate participants' satisfaction with the CyberAmbassadors curriculum; capture self-assessments of facilitation skills before and after the TTT experience; and solicit participants' input on the TTT program. Feedback from the first training was used to optimize the agenda for the second TTT offering, but the topics, activities, and content were consistent across the two trainings. The second TTT was hosted just a few weeks before the institution shifted to remote operations due to the COVID-19 pandemic, so plans for additional TTT programs were paused until the summer of 2022.

There were 52 participants across both TTT programs, 49 of whom opted to participate in the evaluation process. 72% of respondents were male, and 76% of respondents had an earned graduate degree (MS or PhD). Almost all respondents (90%) had previously participated in professional skills training programs, and most (59%) had experience in facilitating this type of

training. These demographics are as expected given that we focused recruitment efforts on academic, research, and industry professionals working in STEM (science, technology, engineering, math), as that was the target audience for the professional skills curriculum.

Program Relevance and Participants' Satisfaction

During the TTT program, participants experienced the core CyberAmbassadors professional skills curriculum (covering Communications, Teamwork, and Leadership) and were also trained in an additional professional skill: Facilitation. The post-training survey asked about the relevance of the training to participants' daily work, and about participants' satisfaction with the training. Items were evaluated with a 5-point Likert scale, from 1 (not at all relevant/satisfied) to 5 (extremely relevant/satisfied). As summarized in Table 3, participants in both TTT programs were fairly consistent in feeling that all aspects of the training were relevant to their daily work. Participants' satisfaction with the training experience was higher in the second TTT offering, which is not surprising as we used feedback from the first TTT program to improve the experience for the second cohort; these results are summarized in Table 4.

Table 3: Relevance of Training to Participants' Daily Work

Topic	Cohort 1 Mean	Cohort 1 SD	Cohort 2 Mean	Cohort 2 SD
Communications	4.64	0.700	4.35	0.745
Teamwork	4.28	0.891	4.30	0.733
Leadership	4.04	0.889	3.85	0.875
Facilitation Skills	4.14	0.891	4.30	0.979

Table 4: Participants' Satisfaction with Training

Topic	Cohort 1 Mean	Cohort 1 SD	Cohort 2 Mean	Cohort 2 SD
Communications	3.96	1.02	4.55	0.510
Teamwork	3.68	1.03	4.25	0.851
Leadership	3.68	1.03	4.20	0.696
Facilitation Skills	3.71	1.15	4.45	0.686

Open-ended responses provided more insight into participants' experiences during the TTT program. Participants liked the fact that the workshop included a variety of activities, with storytelling, role-playing, and problem-solving exercises frequently noted as highlights. Participants also noted that the core curriculum and facilitator materials were detailed and well organized, providing a systematic framework for understanding and developing professional skills. The content was relevant, well researched, easy to understand, and provided copious strategies to improve communications, teamwork, leadership and facilitation skills. Tools like the detailed agenda template, which allows facilitators to select content at the level of individual activities and learning goals, were noted as well-organized and helpful for creating trainings that align with audiences' learning goals. Participants also appreciated the opportunities to practice facilitation skills during the training, using the actual curriculum materials that they would use to

develop trainings for their own audiences. The open-source licensing of both the core curriculum and the TTT materials was also seen as a strength of the program.

The open ended responses also contained constructive criticism and ideas for how to improve both the core curriculum and the TTT experience. The first cohort, in particular, suggested adjusting the balance between experiencing the curriculum and practicing facilitation skills to allow more time to try leading the learning themselves. This feedback was used to revise the agenda for the second TTT program, and that cohort reported higher satisfaction. Other responses suggested broadening the core curriculum to include more case studies and examples for diverse audiences, as the initial curriculum was largely focused on cyber-infrastructure professionals. When the pandemic forced a pause in facilitator training, the project team shifted focus to expanding the curriculum materials based on this feedback – with the result that there are now more examples for a broader range of audiences.

Changes in Participants' Interest, Knowledge, and Confidence

We asked TTT participants to rate their levels of interest and knowledge before and after the training in four skill areas: Communication, Teamwork, Leadership, and Facilitation. There were increases in interest (Table 5) and in knowledge (Table 6) in all areas. We also asked participants to assess their facilitation skills before and after the training, focusing on three key elements: understanding the characteristics of effective facilitation; confidence in their ability to facilitate professional skills trainings; and confidence in their ability to adapt materials to customize a training. Results showed increases in all three areas for both cohorts, and interesting differences between the groups (Table 7).

The first TTT program included more participants with previous facilitation experience, and the agenda focused more on experiencing and understanding the curriculum than on facilitation practice. Thus, it is not surprising that Cohort 1 reported smaller gains in confidence facilitating. The second cohort had relatively less facilitation experience prior to the TTT program, and we also adjusted the agenda to provide more balance between learning the curriculum and learning to facilitate. These factors likely contributed to the higher gains reported by Cohort 2 in understanding and application of facilitation skills (as compared to learning about the curriculum). Overall, however, these self-assessments of interest, knowledge and confidence indicate that the TTT program was effective at preparing participants to use the curriculum to offer trainings in their own communities.

Table 5: Participants' Interest (Before and After)

Topic	Cohort 1 Mean (SD)			Cohort 2 Mean (SD)		
	Before	After	Difference	Before	After	Difference
Communications	4.55 (0.632)	4.76 (0.689)	0.21 (0.675)	3.79 (0.535)	4.47 (0.513)	0.68 (0.675)
Teamwork	4.03 (1.017)	4.48 (0.738)	0.45 (0.783)	3.74 (0.733)	4.42 (0.607)	0.68 (0.783)
Leadership	4.24 (0.872)	4.62 (0.775)	0.38 (0.494)	3.79 (0.787)	4.58 (0.507)	0.79 (0.478)
Facilitation Skills	4.03 (1.117)	4.62 (0.728)	0.59 (0.780)	3.53 (0.964)	4.63 (0.496)	1.10 (0.671)

Table 6: Participants' Knowledge (Before and After)

Topic	Cohort 1 Mean (SD)			Cohort 2 Mean (SD)		
	Before	After	Difference	Before	After	Difference
Communications	3.79 (0.726)	4.28 (0.649)	0.49 (0.509)	3.63 (0.597)	4.53 (0.513)	0.90 (0.631)
Teamwork	3.62 (0.903)	4.10 (0.724)	0.48 (0.634)	3.47 (0.612)	4.37 (0.496)	0.90 (0.875)
Leadership	3.55 (0.985)	4.17 (0.805)	0.62 (0.677)	3.47 (0.772)	4.37 (0.684)	0.90 (0.567)
Facilitation Skills	3.61 (0.916)	4.29 (0.763)	0.68 (0.612)	3.11 (0.937)	4.47 (0.513)	1.36 (0. 567)

Table 7: Participants' Confidence (Before and After)

Topic	Cohort 1 Mean (SD)			Cohort 2 Mean (SD)		
	Before	After	Difference	Before	After	Difference
Understanding Effective	3.84 (0.911)	4.34 (0.670)	0.50 (0.639)	3.21 (0.631)	4.42 (0.507)	1.21 (0.631)
Confidence in Ability to facilitate	3.48 (1.243)	4.38 (0.775)	0.90 (0.817)	3.16 (0.898)	4.16 (0.602)	1.00 (0.577)
Confidence Customizing Materials	3.72 (1.032)	4.41 (0.907)	0.69 (0.712)	3.21 (1.273)	4.42 (0.607)	1.21 (0.976)

Participants' Implementation Plans

Our surveys asked participants about the types of training that they planned to organize and facilitate, and what additional supports they might need to reach these goals. These open ended responses included several themes, like providing opportunities for facilitators to exchange knowledge and ideas; offering opportunities to co-facilitate; and developing materials to support effective facilitation in different contexts, like in fully-online trainings offered via videoconference. Most participants reported that they would organize trainings at their workplace or home academic institution, although others planned to facilitate sessions at national conferences or professional meetings. The desire for descriptive marketing materials was also expressed frequently, as participants noted that they could use assistance in "selling" the program to potential audiences (although the training is provided free of charge, hosts generally provide facilities and help to recruit participants). Most participants indicated that they planned to start by organizing a 1-2 hour, in-person training session and build from there.

Evaluating and Supporting Facilitators' Success

One of the tools that was developed with the professional skills curriculum was a brief survey used to provide feedback on the trainings offered by facilitators prepared through our TTT program. This evaluation tool is deployed in Google forms, optimized for mobile platforms, and designed to be completed at the end of the training, before participants leave. Facilitators are provided with a standard evaluation slide to include towards the end of their trainings, which offers a shortened URL and QR code for participants to access the feedback form.

The form asks participants to respond to the following questions using a 5-point Likert scale, with options from “Strongly Agree” to “Strongly Disagree.”

- The session material was interesting or helpful.
- The session material was relevant to my work or major.
- The facilitator explained the material clearly.
- The facilitator was knowledgeable.
- The facilitator was engaging.
- I would recommend this training to my colleagues or fellow students.

The evaluation form also has open-ended response areas where participants can request more information about the program and/or share additional comments and feedback about the training. The specific questions used on this evaluation were adapted from a survey used by a partner in the CyberAmbassadors project [23]. The goal of this evaluation tool is to quickly gauge participants’ interest and engagement with the session materials, and to provide the facilitator with feedback on their skills. While it is not an in-depth questionnaire, we have found that participants are much more likely to respond to a short, multiple-choice survey than longer variations we’ve used in the past. About 1/3 of participants respond to the open-ended questions, and anecdotally we tend to see more free form responses when there are improvements to be made in the materials and/or facilitation. Facilitators are provided with the feedback from their sessions, and the program coordinators debrief with them as needed to identify needs for additional training and support.

Concluding Discussion and Future Plans

Since the professional skills curriculum was first piloted in 2018, there have been more than 150 trainings teaching communication, teamwork, and leadership skills to more than 5,300 total participants (as of April 1, 2022). While the majority of this training was conducted by the CyberAmbassadors curriculum development team, the TTT program has allowed us to expand the outreach and impact of this NSF-funded project significantly. To date, 23 participants in our “train the trainers” experience have facilitated a total of 51 training sessions serving about 1,700 individuals. These contributions make up 32% of the total impact of our professional skills curriculum so far, and demonstrate the potential of building effective programs to prepare new facilitators.

The global COVID-19 pandemic had a dramatic impact on our project, as personal and professional priorities understandably shifted. Over 50 volunteers participated in the TTT programs and initially agreed to organize and facilitate at least 4 hours of training on their own. However, priorities and opportunities changed during the pandemic and, quite understandably, more than half of the TTT participants have not yet facilitated trainings of their own. Some have moved on to other goals, but many others remain engaged and as pandemic restrictions begin to ease there is more interest in the program. In Spring 2022 we organized an in-person training for student leaders at Cal State Sacramento, conducted entirely by facilitators trained through the TTT program or by co-teaching with existing facilitators. We have also received an extension from the NSF to continue the original program for a fifth year, with the goal of hosting 2-3 additional TTT sessions during Summer 2022 to prepare more facilitators.

In addition to training facilitators and helping them to organize their own trainings, we have developed a robust online community for facilitators to connect with each other, share ideas and materials, and plan for future events. A number of the facilitators assisted with adapting the curriculum materials for fully-online delivery, and we have reached almost 4,000 participants through remote trainings. While we have embraced the return to in-person trainings as pandemic conditions permit, we have also learned a great deal about how to facilitate effectively online and will work to refine and disseminate those experiences in the near future.

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