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Executive Summary

The PhysTEC 2020 conference was successful at achieving its goals to provide information and connection to a growing network of physics teacher educators. Indications of the success of the conference include:

- Positive comments on the end of conference feedback form.
- Positive ratings on individual session feedback (average rating: 85%).
- A wide variety of intended actions that participants plan to try when returning home.
- Reports of key changes in perspective on the part of participants, including a national perspective, confidence in their work, and understanding the needs of teachers.
- Evaluator observations of engagement.
- Evidence of continuous improvement of the conference experience on the part of PhysTEC staff.

In this conference we used a few novel evaluation techniques to probe different elements of participant experience, including their deeper motivations, persistent challenges, and their experience of individual sessions.

Findings

Motivations: On the surface, many participants attend to network, share ideas, share information from their own program, and learn from successful programs. When prompted to go deeper into their motivations, participants most often named big-picture goals (such as desiring all students to be able to learn physics), a public mission (such as addressing the teacher shortage), and personal satisfaction gleaned from the work. The evaluators saw value in asking participants to reflect on both surface and deeper reasons through this activity (“Five Whys”), and the reasons provided also give insight into what drives participants -- to come to the conference, and to engage in the work.

Challenges: Participants were asked to self-rate their challenges to training physics teachers and name resources that can help address those challenges, through a sticky-note voting activity set in the hallway of the conference space. Participants were also asked during the closing session to name challenges that had not been addressed by the conference content. The engagement activity was only moderately successful, but did surface some interesting findings. First, “perceptions of teaching” (by students, faculty and the public) was the top-rated challenge, with “the teacher certification process is too long or expensive” coming in close behind. Several other challenges named were specific to the certification process and state requirements, indicating that this is a particularly common challenge. In the end-of-conference feedback, respondents added the categories of getting program funding, coordinating with the school of education, and challenges of a small department. These challenges may be informative for the website redesign and for future conferences.
**Session ratings.** The session ratings are informative in noting exemplary and potentially problematic sessions, though it is not clear to what degree these confirm observations of PhysTEC staff.

**Actions.** Most participants were able to note concrete actions they plan to undertake, most commonly the use of Get the Facts Out, actions related to a Learning Assistant program, recruiting strategies, or use of the Underrepresentation Curriculum or Periscope. A few also mentioned Noyce proposals, K-12 teacher connections, advocacy, PhysTEC regional networks, and curricular modifications.

**Perspective.** Many participants also noted changes in perspective as a result of the conference, such as:
- Gaining a national perspective (e.g. it’s worse than I thought).
- Gaining confidence or clarity in their work (e.g. useful advice from others; a sense that they can do this now.)
- Understanding the needs of teachers.
- Expanding their view of potential partnerships, such as schools, community colleges, and other institutions.

**Logistics.** A few comments about logistics included praise for staff, for the variety of sessions and for the interactive sessions, and the increase in emphasis on diversity and social justice. A few recommendations were made for changes to the opening session, and including more diverse presenters.

**Recommendations**

**Use results in planning the next conference**

- Consider inviting some of the most highly rated session presentations to repeat their presentations. All five of these sessions also provided information on topics that are of great interest to the community (e.g. LA programs, diversity and inclusion, community colleges).
- Discuss the session rating results with the lower-rated sessions to improve the sessions and/or consider not inviting them in the future.
- Re-envision the opening session to be more interactive, including redesigned data visualizations, and to offer awardees opportunities to share key lessons. The addition of the icebreaker was often cited as valuable, but overall the session is not well-rated.
- Provide a teacher panel again in the future, but with clearer guidelines for moderation, and focus on the question of preparation to teach rather than career path.
- Provide the table topics again in the future, but use smaller groups, clearer facilitation instructions, and consider a time other than breakfast.
- Continue the emphasis on Get the Facts Out given that this is a key challenge, and many plan to use the resources in the future.
Consider addressing the key challenges cited (from Engagement Activity and End of Conference Evaluation): perceptions of teaching as a profession, certification processes, state or institutional requirements, faculty time, program funding, and challenges of small departments. “Forging partnerships” also seems a potentially valuable focus which ties across several elements of the conference feedback.

Continue to offer adequate networking time, focus on diversity, and try out new topics.

Consider using a rubric or spreadsheet for evaluating session and presenter topics - is there a range of topics for different types of attendees? Are key topics covered but not repeated? Is there a diversity of presenters?

Update the “Tips for Presenters” sheet with any lessons learned about successful sessions.

Use results to further develop website personas

Harvest the results of this report for the website redesign: Particularly participant motivations (from Five Whys) and challenges (above). Some tentative ideas that emerge from this work include: To draw people into PhysTEC activities on the surface, promise general networking and ideas, offer opportunities to gather specific relevant information, invite them to speak, or leverage their engagement in PhysTEC (e.g. a grant award). To design PhysTEC engagement to speak to the deeper motivations of participants, draw on their commitment to a deeper mission to address teacher shortages, achieve quality physics instruction for all, or their own personal satisfaction in teacher preparation.

Use results to continue to improve the evaluation process

Continue the use of “Five Whys” as an icebreaker and casual evaluation activity, but do not use the sticky-note engagement activity.

Determine whether the session ratings provide valuable insight (based on staff and presenter feedback) and thus whether to offer them in the future. If they are used in the future, include the QR codes directly in the program or on slips of paper that are specific to the sessions in a particular room.

Do the end-of-conference evaluation as an online short survey only rather than a closing session activity, as it was not sufficiently interactive and written responses were a barrier to analysis.
Methods

The evaluation for the 2020 PhysTEC Conference consisted of four main activities, intended to experiment with different evaluation approaches. Copies of the evaluation forms are in Appendix F.

[1] Opening Session Activity: Five Whys. This activity was adapted from a technique used in the business management world to identify the root causes of problems. In this case, we began with the question ‘Why are you here at the PhysTEC conference?’ and then ask why that is true four subsequent times. Rather than delving into root causes of problems, we hoped to delve into root sources of motivation. The activity acts as formative evaluation, so not just giving us data on attendee motivations, but giving attendees a chance to evaluate their own situation. Additionally, the activity acts as an ice breaker to start conversations.

[2] Individual Session Feedback. An online survey was created for each of the sessions taking place at the 2020 PhysTEC Conference. The surveys were accessible through URLs or QR codes made available on presenter slides or on slips of paper. Each survey had the same three questions. “How useful was this session?” asked participants to respond using a slider, which recorded data on a scale from 0-100. “What did you like about this session?” and “How could this session have been more effective?” were open ended items where attendees could type their responses. The goal of this activity was to compare sessions and identify those that were seen as more useful to the audience while also providing actionable feedback to the presenters.

[3] Engagement Activity: Sticky Note Voting. This is a form of evaluation that invites ongoing participation from attendees throughout the event. We set this activity up on a wall in the common area of the conference. To begin, a set of obstacles to recruiting and training physics teachers was posted and participants were invited to vote on which of those obstacles they face in their own practice. Additionally, there was space for attendees to write about resources they have found helpful in addressing those obstacles. The goal of this evaluation activity was partly summative, to identify common obstacles and resources that can be used to address them. It was also partly a formative evaluation, allowing participants to consider their own situations and begin to open dialogues about them.

[4] Closing Session: Feedback Form. The final feedback form consisted of three primary questions. “What is the thing you most want to try, or explore further, when you get back to your home institution?” “Did you have any lightbulb moments or changes in perspective while at the conference?” and “What is one obstacle that you face at your home institution, or something that you wanted to learn, that wasn’t addressed at the conference?” These questions were intended to probe the content of the conference, looking for techniques and ideas that made an impact and also content that was missing and could be added in the future. The feedback form also invited open comments on the back of the sheet. The form was available through SurveyMonkey for attendees who needed to leave the conference early.
Findings

Attendee Appreciation for PhysTEC and the PhysTEC Conference

Throughout the data collected, we found participants expressing positivity for PhysTEC and the conference. Some expressed that the content was relevant and useful:

“I met with many new people that opened new direction for me regarding teacher preparation programs, improvement of my classroom practices, education policy and more broadly education. Thanks a lot for such a wonderful and productive community. I enjoyed a lot!”

“I would like to thank you the PhysTEC leadership team that put this wonderful conference together with many relevant and informative sessions useful to our teacher preparation and teacher education programs. Thank you so much!”

Others feel a strong connection to the PhysTEC community:

“Wonderful conference! I love the PhysTEC family.“

“The program is growing, so I got to meet with new people. Also I am now feeling more strongly connected to the PhysTEC community and family, which is very helpful in terms of getting help, directions, access to resources for pursuing my own goals and my institute goals. Thanks a lot!”

Others expressed approval for the conference itself:

“This year’s conference was exceptional! The topics, session and attendance really was wonderful! I would love to continue to be involved!”

“Probably one of the best conferences I’ve been to. Thank you.”
Conference improvement

The conference organizers have engaged in continuous improvement of the conference, attending to feedback from a variety of sources.

Notable differences

Notable differences in this conference compared to years past include the following:
- Icebreaker (5 Why’s activity, facilitated by evaluator)
- Name Tag identifiers: Stickers, ribbons, and pronouns
- Facilitated topical table discussions
- New sessions: Underrepresentation curriculum, PTAP.HE coding, PEER physics suite, Pyper plenary on advocacy, meeting with PhysTEC advisors, Noyce scholarship session, teacher panel.

Response to evaluation feedback

Many of the previous evaluation recommendations were implemented in the current conference. A few lingering issues remain, but overall the attention to continuous improvement is exemplary.

<table>
<thead>
<tr>
<th>Evaluation recommendation</th>
<th>PhysTEC action</th>
</tr>
</thead>
</table>
| Maximize formal and informal networking opportunities (icebreakers, topical roundtables, informal opportunities) | ● Incorporated icebreaker (Five Whys)  
● Used stickers for first time attendees.  
● Dinners for sites and Fellows.  
● Added facilitated table topics.  

**Areas of continued concern:**  
● Safe space for newcomers (was a problem for at least one person). |
| Improve the quantity and quality of food offerings | ● Tried to balance food offerings.  

**Areas of continued concern:**  
● Breakfast had insufficient protein offerings. |
| Entice second-time attendees | ● Decided not to address this; focusing on other areas of conference recruitment. |
| Make a few programmatic changes (more teacher inclusion, address quality of teachers, recommend how to work with Education partners, improve slides in opening plenary, improve name badges.) | ● Addressed many of these, including name badge ribbons.  

**Areas of continued concern:**  
● Opening plenary slides and approach not iterated (noted as a problem) |
Opening Session Activity: Five Whys

Data from the Five Whys activity consisted of the succession of answers to the question ‘why?’ We found some common elements that participants touched on as they passed through their own individual reasoning. The numbers in the table below refer to the number of attendees who touched on that element at least once in their five responses, out of a total of 72 respondents.

<table>
<thead>
<tr>
<th>Label</th>
<th>Example statements</th>
<th>N</th>
<th>Reasons</th>
</tr>
</thead>
<tbody>
<tr>
<td>Info-sharing</td>
<td>I am here for general networking and idea sharing; I am looking for tips and strategies (general, passive)</td>
<td>34</td>
<td>Beginning of reasoning</td>
</tr>
<tr>
<td>Info-offering</td>
<td>I was invited to speak; I have a program others can model; I have info to share</td>
<td>17</td>
<td></td>
</tr>
<tr>
<td>PhysTEC</td>
<td>PhysTEC Community; roles within PhysTEC; grant awards</td>
<td>20</td>
<td></td>
</tr>
<tr>
<td>Role</td>
<td>I’m here because of my role as a teacher; (faculty, department chair, program lead)</td>
<td>12</td>
<td>Mixed</td>
</tr>
<tr>
<td>Info-seeking</td>
<td>I’m here to gather specific information to bring home; We are starting a program and want to learn from successful programs</td>
<td>16</td>
<td></td>
</tr>
<tr>
<td>Mission</td>
<td>Need to address a shortage; recruitment is hard; battling stigma</td>
<td>24</td>
<td></td>
</tr>
<tr>
<td>Big Picture</td>
<td>Physics learning is good for students; scientific literacy is good for society; we can increase equity and inclusion</td>
<td>32</td>
<td>End of reasoning</td>
</tr>
<tr>
<td>Satisfaction</td>
<td>I care about training physics teachers; This is very rewarding and fulfilling to me</td>
<td>19</td>
<td></td>
</tr>
</tbody>
</table>

Two of the codes, info-sharing and info-seeking, are similar, so it is worth taking a moment to distinguish between the two. Responses were coded as info-sharing if they were general, passive, or two-way. An info-sharing response might be ‘I am here to network and to pick up new tips for recruitment.’ Info-seeking is more focused and active. An info-seeking response might be ‘Other schools have successful programs that we can use as models for ours.’ Several respondents started with a general statement about learning and, in response to the ‘why’ question, moved to a more focused statement, so the two often co-occur.

While we did not find any common profiles—participants tended to follow their own individual path through reasoning about motivation—there were some patterns in the use of individual elements. The Info-sharing, Info-offering, and PhysTEC codes were most often used at the
beginning of the chain of reasoning. They are the ‘surface’ or ‘nominal’ reasons that most attendees gave for attending the conference. The Big Picture and Satisfaction codes most often appeared at the end of the chain of reasoning, as participants delved into ‘deeper’ reasons and motivations. The Role and Info-seeking elements were scattered throughout.

It appears that the attendees of the PhysTEC 2020 Conference had the kind of mix of reasons that one would hope for in conference attendees. Many had a passive interest in networking and idea sharing, others were seeking information to help with specific initiatives, and others had information to share. Most participants touched on something deeper and idealistic about the importance of physics education and/or a personal fulfillment that comes from training physics teachers. Further, some of the respondents were PhysTEC super-users who were taking active roles in the community. The following tentative conclusions could follow:

- To draw people into PhysTEC activities on the surface, promise general networking and ideas, offer opportunities to gather specific relevant information, invite them to speak, or leverage their engagement in PhysTEC (e.g. a grant award).
- To design PhysTEC engagement to speak to the deeper motivations of participants, draw on their commitment to a deeper mission to address teacher shortages, achieve quality physics instruction for all, or their own personal satisfaction in teacher preparation.

The activity appeared to be beneficial for those involved, based on the thoughtful reasoning presented, the fact that several people mentioned the activity as a particularly valuable part of the opening plenary, and the fact that several people spontaneously mentioned that they enjoyed the activity and planned to use it in other contexts.
Engagement Activity: Sticky Note Voting

Participants populated a list of challenges, voted on which challenges they face, and suggested strategies and resources for addressing obstacles. The two most commonly endorsed challenges are ‘Student/faculty/public perceptions’ and ‘the teacher certification process is too long or expensive.’ Overall, few strategies and supports were suggested by attendees. This may be a lag in attendee participation, but may also indicate a lack of available supports. The photo of the sticky board, and recommended resources, are in Appendix C.

The table below contains the full list of obstacles and the number of votes cast by participants.

<table>
<thead>
<tr>
<th>Obstacle</th>
<th># Votes</th>
<th>Obstacle</th>
<th># Votes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Student/faculty/public perceptions</td>
<td>11</td>
<td>District’s willingness to hire uncertified teachers</td>
<td>2</td>
</tr>
<tr>
<td>Teacher certification process is long or expensive</td>
<td>7</td>
<td>Recruiting candidates for teacher prep</td>
<td>6</td>
</tr>
<tr>
<td>Lack of time to work on teacher prep</td>
<td>4</td>
<td>Size of the physics program</td>
<td>4</td>
</tr>
<tr>
<td>Teacher partners in the community</td>
<td>4</td>
<td>Teacher salary</td>
<td>3</td>
</tr>
<tr>
<td>Funding for teacher prep program</td>
<td>4</td>
<td>Students don’t arrive thinking about careers as teachers</td>
<td>1</td>
</tr>
<tr>
<td>State teacher certification requirements are not innovative</td>
<td>4</td>
<td>Lack of teacher role models</td>
<td>4</td>
</tr>
<tr>
<td>General science pedagogy</td>
<td>2</td>
<td>State teaching certification requirements are inappropriate</td>
<td>1</td>
</tr>
</tbody>
</table>

We note that several of these challenges are about state or institutional requirements.
Individual Session Feedback

Session ratings: Half participate, generally positive ratings

The average response rate for sessions was 55%, and the average rating was 83. There were no responses to the teacher panel discussion. Session ratings are skewed towards positive ratings, with very few under 70; the figure below shows the histogram of the average rating across all 19 rated sessions.

![Histogram of all average session ratings](image)

Highly rated sessions

The most highly rated sessions (>90) are ones to consider repeating in future years:

- Essential Elements for Setting Up your Learning Assistant Program (Otero)
- Periscope (Scherr)
- Cultivating Inclusive Culture through LA Program (Close)
- The Underrepresentation Curriculum Project (Daane and Rifkin)
- Recruiting Teachers through Community College Partnerships (Magee-Sauer)

Lower rated sessions

The sessions which were rated well below average (<77) may need some work before repeating.
Teacher panel
The teacher panel was not rated (the evaluation slide was not shown) so it is difficult to gauge the reaction, but some end-of-conference comments suggest it was a useful session to get perspective on teacher experiences. However, my perspective is that the session suffered from poor moderation, and there was inadequate time for Q&A. I felt that we did not need to know as much about the teachers’ career path, but rather how their program did (or did not) prepare them for their work.

Table Topics
Additionally, the Table Topics discussion seemed to work very well (see Appendix B), with people being able to get information about what is happening at other institutions, problem solve, and get direct access to experts on a topic they care about. There were some requests to have smaller groups, clearer instructions, and to not do this at breakfast time. I suggest doing this session in the future.

All presenters have been provided with written feedback on their session, including the session rating, attendee feedback, and evaluator feedback.
End of Conference feedback

This section summarizes feedback from the closing session evaluation, plus responses received via SurveyMonkey after the end of the conference.

Variety of actions

When asked what is “one thing from the conference you would most like to try when you get back to your home institution”, a variety of concrete actions were cited. The most common were:

- **Learning Assistant program (initiate or improve)** (N=12)
- **Get the Facts Out** (N=10)
- **General recruiting** (N=8) - particularly prevalent among new Recruiting sites
- **Underrepresentation curriculum** (N=5)
- **Periscope** (N=4)

Other actions getting honorable mention include Noyce proposals (N=3), K-12 teacher connections (N=4), advocacy (N=2), PhysTEC networks (N=2), and curricular modifications (N=3).

“(I’d like to) develop an LA program that can support course transformation while simultaneously work as a community building and recruitment tool for our physics/physics education program.” - survey respondent

Broader perspective

Participants gained a variety of broadened perspectives. When asked “Did you have any lightbulb moments or changes in perspective,” the broader impact of the conference becomes clear. The overarching theme of the responses is that the conference provided important changes of perspective, or an understanding of the viewpoint of other people.

**Many gained a national perspective** (N=7). “At a national level (the physics teacher shortage) is worse than I thought.” “How many interesting programs are going on in the country.” “Needs across STEM disciplines are very similar.” “There is a large group of people interested in improving science education.” “There are several common issues facing us all.”

**Many gained confidence or clarity about their own work** (N=7). Many cited small group or personal discussions that led to this insight. “I got clear and useful advice from a small group that… got me unstuck.” “Now I feel like I might be able to (build a STEM teacher certification program).” “I now see a pathway to actualizing such a program at my institution.”

**Many better understood the needs of teachers** (N=6). “Teachers’ experiences in the panel.” “The need of asking local high school teachers what they need help with in the classroom.”
Many expanded their view of potential partnerships (N=5). “It was useful listening to the in-service teachers talk about what they would like from a partnership with a nearby college.” “The variety of ways I can partner with schools and community-based organizations,” “recruiting in the community colleges.” “I want to create a regional PhysTEC network.”

Other responses included feeling more capable of doing education research themselves, or a reminder of research that could inform their practice, insights from the Periscope session, and insights related to diversity. There were no clear trends by the type of the site.

Challenges

When asked to name “one obstacle that you face…that wasn’t addressed by the conference,” respondents named a wide variety without clear consensus. These are listed as potential ideas for future conferences:

- **Time** (N=7), including time to work on teacher preparation and local human resources.
- **Getting program funding** (N=5) - including institutional support, LA funding, and external sources. *Evaluator: Advocating for resources has been a big focus in EP3, and you might get a session from that group next time.*
- **Coordinating with school of education** (N=4), including CAEP requirements, hearing from college of education leaders on recruitment.
- **Challenges of a small program or department**. (N=3)
- **Reducing time to certification** (N=2), including getting it down to 4 years, and reducing number of required courses.
- Getting other STEM departments involved as champions.
- Causes for student attrition in physics teacher education programs.
- What an established mentoring program looks like, with in-service teachers mentoring pre-service teachers.
- Low numbers of physics teachers in the region.
- Pedagogy courses that can be run for upper-level physics majors.
- Challenges of teaching online (which may become increasingly prevalent in the COVID-19 era).
- Change happens slowly, but we need to move more quickly.
- Partnerships to support current K-12 teachers.
- How to get faculty to work with LAs in a way that the LAs have true ownership of the classroom and the faculty respect them.
- Recruiting physics majors.
- Hear from principals of schools on what their biggest challenges are.
- How to influence faculty that teaching is a viable career.
- Getting started with PhysTEC-like work.
- *Evaluator: a session on state advocacy, plus a table discussion for experienced attendees wishing to jump-start an advocacy initiative, might be a valuable addition.*
Conference organization

Participants gave a variety of praise and suggestions regarding conference organization:

- Thank you for providing a lot of networking time between sessions!
- I’d love to see more diversity in the presenters as we work to diversify the teacher and faculty pipeline. I saw more of an emphasis on diversity and social justice this year compared to other years.
- I liked that new speakers were invited to talk about issues that hadn’t been discussed before.
- Opening session was too long, with no break.
- Having guidelines for discussion would help (but most people are great).
- The breakfast was not sufficient for me - I need at least something with protein in it.
- The staff was amazing, especially Annelise.
- There were much more interactive sections to the sessions, which was very helpful.
- The variety of workshops and breakfast table topics were fantastic.
- Put the wifi code in the folders.
- Evaluator: The color coding and ribbons were a great innovation. Double-sided name tags would help with the tendency to flip around.
Recommendations

Use results in planning the next conference

- Consider inviting some of the most highly rated session presentations to repeat their presentations. All five of these sessions also provided information on topics that are of great interest to the community (e.g. LA programs, diversity and inclusion, community colleges).
- Discuss the session rating results with the lower-rated sessions to improve the sessions and/or consider not inviting them in the future.
- Re-envision the opening session to be more interactive, including redesigned data visualizations, and to offer awardees opportunities to share key lessons. The addition of the icebreaker was often cited as valuable, but overall the session is not well-rated.
- Provide a teacher panel again in the future, but with clearer guidelines for moderation, and focus on the question of preparation to teach rather than career path.
- Provide the table topics again in the future, but use smaller groups, clearer facilitation instructions, and consider a time other than breakfast.
- Continue the emphasis on Get the Facts Out given that this is a key challenge, and many plan to use the resources in the future.
- Consider addressing the key challenges cited (from Engagement Activity and End of Conference Evaluation): perceptions of teaching as a profession, certification processes, state or institutional requirements, faculty time, program funding, and challenges of small departments. “Forging partnerships” also seems a potentially valuable focus which ties across several elements of the conference feedback.
- Continue to offer adequate networking time, focus on diversity, and try out new topics.
- Consider using a rubric or spreadsheet for evaluating session and presenter topics - is there a range of topics for different types of attendees? Are key topics covered but not repeated? Is there a diversity of presenters?
- Update the “Tips for Presenters” sheet with any lessons learned about successful sessions.

Use results to further develop website personas

- Harvest the results of this report for the website redesign: Particularly participant motivations (from Five Whys) and challenges (above). Some tentative ideas that emerge from this work include: To draw people into PhysTEC activities on the surface, promise general networking and ideas, offer opportunities to gather specific relevant information, invite them to speak, or leverage their engagement in PhysTEC (e.g. a grant award). To design PhysTEC engagement to speak to the deeper motivations of participants, draw on their commitment to a deeper mission to address teacher shortages, achieve quality physics instruction for all, or their own personal satisfaction in teacher preparation.

Use results to continue to improve the evaluation process
● Continue the use of “Five Whys” as an icebreaker and casual evaluation activity, but do not use the sticky-note engagement activity.

● Determine whether the session ratings provide valuable insight (based on staff and presenter feedback) and thus whether to offer them in the future. If they are used in the future, include the QR codes directly in the program or on slips of paper that are specific to the sessions in a particular room (possibly with multiple sessions on a single QR code).

● Do the end-of-conference evaluation as an online short survey only rather than a closing session activity, as it was not sufficiently interactive and written responses were a barrier to analysis. Continue asking participants about their change in perspective, but perhaps ask them to indicate what in the conference contributed to that change in perspective.
Appendices

Appendix A: Conference program

[Link to program.]

Full Schedule:

<table>
<thead>
<tr>
<th>Time</th>
<th>Title</th>
<th>Location</th>
<th>Presented by</th>
</tr>
</thead>
<tbody>
<tr>
<td>5:30 PM - 7:30 PM</td>
<td>Dinner for Fellows and Supported Site Leaders (by invitation only).</td>
<td>Hard Rock Cafe, Downtown Denver</td>
<td></td>
</tr>
<tr>
<td>6:00 PM - 8:30 PM</td>
<td>Registration</td>
<td>Main Foyer</td>
<td></td>
</tr>
</tbody>
</table>

**Friday, February 28**

<table>
<thead>
<tr>
<th>Time</th>
<th>Title</th>
<th>Location</th>
<th>Presented by</th>
</tr>
</thead>
<tbody>
<tr>
<td>7:30 AM - 8:30 AM</td>
<td>Registration &amp; Breakfast</td>
<td>Main Foyer</td>
<td></td>
</tr>
<tr>
<td>8:00 AM - 9:45 AM</td>
<td>State of PhysTEC Address and PhysTEC Awards Ceremony</td>
<td>Windows</td>
<td>Monica Plisch</td>
</tr>
<tr>
<td></td>
<td>Building Relationships Between Physics Departments and Schools of Education</td>
<td>Tower Court A</td>
<td>Alice Churukian Jennifer Docktor Kurt Fletcher</td>
</tr>
<tr>
<td></td>
<td>New Resources for Getting the Facts Out about STEM Teaching Professions</td>
<td>Tower Court B</td>
<td>Drew Isola Wendy Adams Savannah Logan Duane Merrell</td>
</tr>
<tr>
<td>11:45 AM - 1:00 PM</td>
<td>Networking Break</td>
<td>Main Foyer</td>
<td>Wendy Adams Jared Breakall Savannah Logan</td>
</tr>
</tbody>
</table>

**Saturday, February 29**

<table>
<thead>
<tr>
<th>Time</th>
<th>Title</th>
<th>Location</th>
<th>Presented by</th>
</tr>
</thead>
<tbody>
<tr>
<td>11:15 AM - 11:45 AM</td>
<td>Faculty Perceptions of the Teaching Profession: PTaP.HE categorization, interpretation, and setting a benchmark</td>
<td>Tower Court A</td>
<td>Wendy Adams Jared Breakall Savannah Logan</td>
</tr>
<tr>
<td>Time</td>
<td>Title</td>
<td>Location</td>
<td>Presented by</td>
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</tr>
<tr>
<td>1:15 PM - 2:45 PM</td>
<td>Program Sustainability: Building Institutional Commitment for Teacher Education</td>
<td>Tower Court B</td>
<td>Stamatis Vokos</td>
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<td></td>
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<td>Ron Henderson</td>
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<td>Scott Paulson</td>
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<td>John Simonetti</td>
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<td></td>
<td>Supporting Teachers in Their Instruction and in Meeting Longer-Term Professional Goals with the PEER Physics Suite</td>
<td>Tower Court C</td>
<td>Valerie Otero</td>
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<td></td>
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<td>Shelly Belleau</td>
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<td></td>
<td>Emily Quinty</td>
</tr>
<tr>
<td>3:00 PM - 4:15 PM</td>
<td>Lunch Plenary -</td>
<td>Windows</td>
<td>Brian Pyper</td>
</tr>
<tr>
<td></td>
<td>Physics Teacher Preparation: Helping Not Hurting</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4:30 PM - 6:00 PM</td>
<td>Best Practices in Recruiting Pre-Service High School Physics Teachers through Community College Partnerships</td>
<td>Tower Court A</td>
<td>Karen Magee-Sauer</td>
</tr>
<tr>
<td></td>
<td>“If You Can’t Measure It, You Can’t Improve It.” Use and Interpretation of the PTEPA Rubric</td>
<td>Tower Court B</td>
<td>Stephanie Chasteen</td>
</tr>
<tr>
<td>5:30 PM - 6:30 PM</td>
<td>Utilizing Teacher Communities to Strengthen Your Teacher Preparation Program</td>
<td>Tower Court C</td>
<td>Jon Anderson</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>Cherie Bornhorst</td>
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<td></td>
<td></td>
<td></td>
<td>Laura Henriques</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Duane Merrell</td>
</tr>
<tr>
<td>6:30 PM</td>
<td>Dinner (on your own or with colleagues)</td>
<td>Downtown Denver</td>
<td></td>
</tr>
</tbody>
</table>

**Sunday, March 1**

<table>
<thead>
<tr>
<th>Time</th>
<th>Title</th>
<th>Location</th>
<th>Presented by</th>
</tr>
</thead>
<tbody>
<tr>
<td>8:00 AM - 9:30 AM</td>
<td>Table Discussions: Problem Solving Around Physics Teacher Preparation</td>
<td>Windows</td>
<td>Facilitators</td>
</tr>
<tr>
<td>9:45 AM - 11:00 AM</td>
<td>How to Start a Regional PhysTEC Network in Your State</td>
<td>Tower Court A</td>
<td>Laura Henriques</td>
</tr>
<tr>
<td></td>
<td>Periscope: Looking Into Learning in Best-Practices Physics Classrooms</td>
<td>Tower Court B</td>
<td>Rachel Scherr</td>
</tr>
<tr>
<td>Time</td>
<td>Event</td>
<td>Location</td>
<td>Speakers</td>
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</tr>
<tr>
<td>11:15 AM -</td>
<td>STEP UP Ambassador Program Workshop</td>
<td>Tower Court C</td>
<td>Bree Barnett Dreyfuss</td>
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<tr>
<td>12:30 PM</td>
<td>Lessons Learned in the Robert Noyce Scholarship Program: Winning and</td>
<td>Tower Court A</td>
<td>Gay Stewart John Stewart</td>
</tr>
<tr>
<td></td>
<td>Servicing the Grant</td>
<td></td>
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<tr>
<td></td>
<td>Cultivating an Inclusive Culture in the Physics Department through a</td>
<td>Tower Court B</td>
<td>Eleanor Close</td>
</tr>
<tr>
<td></td>
<td>Learning Assistant Program</td>
<td></td>
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<tr>
<td></td>
<td>Share-a-Thon: Get the Facts Out</td>
<td>Tower Court C</td>
<td>Vince Kuo</td>
</tr>
<tr>
<td>12:45 PM -</td>
<td>Lunch Plenary</td>
<td>Windows</td>
<td>Matthew Blackman Zach Armstrong</td>
</tr>
<tr>
<td>2:15 PM</td>
<td>Advice from the Trenches: A Panel of Physics Teachers Discusses How</td>
<td></td>
<td>Cherie Bornhorst Stephan Graham</td>
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<tr>
<td></td>
<td>They Were (Or Were Not) Prepared by Their Teacher Education Programs</td>
<td></td>
<td>Shannon Wachowski</td>
</tr>
<tr>
<td>2:15 PM -</td>
<td>Closing Session</td>
<td>Windows</td>
<td>PhysTEC</td>
</tr>
<tr>
<td>2:30 PM</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3:00 PM -</td>
<td>Essential Elements for Setting Up Your Learning Assistant Program</td>
<td>Windows</td>
<td>Valerie Otero Eleanor Close</td>
</tr>
<tr>
<td>6:00 PM</td>
<td></td>
<td></td>
<td>Brooke Evans Laurie Langdon</td>
</tr>
</tbody>
</table>
Appendix B: Five Why’s coding

The raw coding data from the Five Why’s activity is presented in a table on the next page as a series of color coded blocks. The key below maps the colors to the codes and provides some of the example responses for each code. Note that ‘other’ responses remain as white blocks in the figure and blank responses are represented as black blocks in the figure.

It is worth noting that, while there were many common elements, each set of responses was unique. Participants took their own path through a line of reasoning. What patterns we do see are that ‘surface’ reasons tend to be in the info-sharing, info-offering, and PhysTEC categories. Similarly, the ‘deeper’ reasons tend to be in the big picture and satisfaction categories.

<table>
<thead>
<tr>
<th>Color</th>
<th>Label</th>
<th>Example statements</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Info-sharing</td>
<td>I am here for networking and idea sharing; I am looking for tips and strategies</td>
</tr>
<tr>
<td></td>
<td>Info-offering</td>
<td>I was invited to speak; I have a program others can model; I have info to share</td>
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<td></td>
<td>PhysTEC</td>
<td>PhysTEC Community; roles within PhysTEC; grant awards</td>
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<tr>
<td></td>
<td>Role</td>
<td>I’m here because of my role as a teacher; (faculty, department chair, etc)</td>
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<td></td>
<td>Info-seeking</td>
<td>We are starting a program and want to learn from successful programs</td>
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<tr>
<td></td>
<td>Big Picture</td>
<td>Physics learning is good for students; scientific literacy is good for society</td>
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<tr>
<td></td>
<td>Mission</td>
<td>Need to address a shortage; recruitment is hard; battling stigma</td>
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<tr>
<td></td>
<td>Satisfaction</td>
<td>I care about training physics teachers; This is very rewarding and fulfilling</td>
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<tr>
<td></td>
<td>Other</td>
<td>Responses that do not fit the categories are represented by white blocks</td>
</tr>
<tr>
<td></td>
<td>Blank</td>
<td>Responses left blank on the page are represented by black blocks</td>
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<tr>
<td>Participant</td>
<td>First Why</td>
<td>Second Why</td>
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<td>71</td>
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</tbody>
</table>
Appendix C: Sticky note voting

Below is the photo of the sticky note board, plus the list of resources.
The full list of challenges from this and the end of conference activity:
When asked to name "one obstacle that you face….that wasn't addressed by the conference," respondents named a wide variety without clear consensus. These are listed as potential ideas for future conferences:

- **Time** (N=7), including time to work on teacher preparation and local human resources.
- **Getting program funding** (N=5) - including institutional support, LA funding, and external sources. *Evaluator: Advocating for resources has been a big focus in EP3, and you might get a session from that group next time.*
- **Coordinating with school of education** (N=4), including CAEP requirements, hearing from college of education leaders on recruitment.
- **Challenges of a small program or department.** (N=3)
- **Reducing time to certification** (N=2), including getting it down to 4 years, and reducing number of required courses.
- Getting other STEM departments involved as champions.
- Causes for student attrition in physics teacher education programs.
- What an established mentoring program looks like, with in-service teachers mentoring pre-service teachers.
- Low numbers of physics teachers in the region.
- Pedagogy courses that can be run for upper-level physics majors.
- Challenges of teaching online (which may become increasingly prevalent in the COVID-19 era).
- Change happens slowly, but we need to move more quickly.
- Partnerships to support current K-12 teachers.
- How to get faculty to work with LAs in a way that the LAs have true ownership of the classroom and the faculty respect them.
- Recruiting physics majors.
- Hear from principals of schools on what their biggest challenges are.
- How to influence faculty that teaching is a viable career.
- Getting started with PhysTEC-like work.
- *Evaluator: a session on state advocacy, plus a table discussion for experienced attendees wishing to jump-start an advocacy initiative, might be a valuable addition.*

The full list of resources suggested by participants:

- Get the facts out
- SPS outreach
- Build better pathway with the school of ed
- Administrator buy-in, providing resources
- Local AAPT group
- Step up
- PTRA
- Industry fundraising campaign
- Develop pathway for conditionally certified teachers
- Spin Up report
• Advocacy and activism
• Career toolbox
Appendix D: Session data

Below is the histogram of individual session ratings (that is, the ratings provided by each individual respondent, rather than the average within a session as shown in the report).

![Histogram of all individual ratings of sessions](image)

Table topic discussions
The table topic discussions seemed to work very well. The average rating was 85, and the histogram is shown below.

![Session rating histogram](image)

Selected comments are shown below (full comments are provided in the Session Feedback document):

“What worked well?”

- Opportunity to talk with experts about the topic that I am most interested in. Able to learn about other people’s struggles that I hadn’t thought of yet.
- I liked to hear other educators’ experience and stories from their institutes.
- The share out was probably less useful since we sat with the group in which we were interested.
- Ability to speak honestly and frankly about a difficult subject (URM retention) with a small group instead of the general population made it easier to share.
- Facilitated very well to keep discussion on track.
- Real concrete steps offered from others that cared about our topic.
- The chance to hear about what is working and not working at different institutions.
- Talking about common topics is a great thing.

“How could this session have been more effective?”

- Not at breakfast time
- It was very effective. May be if we could have some online follow up meeting with the people in our breakout group after the conference.
- No share out
- Slightly smaller groups
- Was confused about what this was, showed up late, made discussion less useful. Also hard for introverts to start their day this way.
Appendix E: Post conference debrief from staff

From staff report.

Overall, the 2020 PhysTEC Conference was the most attended on record and from the staff point of view, the most organized conference PhysTEC has hosted. Staff received countless thanks and compliments before, during, and after the Conference. In analyzing the event post-mortem, highlights and recommendations for optimization have been identified.

**Highlights:**
- All sessions were well-attended. There were only a handful of people sitting outside the breakout rooms
- Advocacy plenary was very well-liked and felt novel
- Table discussions (a new session type at this conference) sparked discussion that continued through the break afterward
- Post-Conference workshop by LA Alliance leaders was well attended and high quality

**Attendance:** 104 total (109 registrations)

<table>
<thead>
<tr>
<th>Friday unique sign-ins</th>
<th>34</th>
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</thead>
<tbody>
<tr>
<td>Invited Networking Dinner</td>
<td>N/A</td>
</tr>
<tr>
<td>Saturday unique sign-ins</td>
<td>66</td>
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<tr>
<td>Building Relationships Between Physics Departments and Schools of Education</td>
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<tr>
<td>New Resources for Getting the Facts Out about STEM Teaching Professions</td>
<td>29</td>
</tr>
<tr>
<td>The Underrepresentation Curriculum Project</td>
<td>27</td>
</tr>
<tr>
<td>Faculty Perceptions of the Teaching Profession: PTaP.HE categorization, interpretation, and setting a benchmark</td>
<td>20</td>
</tr>
<tr>
<td>Program Sustainability: Building Institutional Commitment for Teacher Education</td>
<td>26</td>
</tr>
<tr>
<td>Supporting Teachers in their Instruction and in Meeting Longer-Term Professional Goals with the PEER Physics Suite</td>
<td>27</td>
</tr>
<tr>
<td>Best Practices in Recruiting Pre-Service High School Physics Teachers through Community College Partnerships</td>
<td>22</td>
</tr>
<tr>
<td>“If You Can’t Measure It, You Can’t Improve It.” Use and Interpretation of the PTEPA Rubric</td>
<td>22</td>
</tr>
<tr>
<td>Utilizing Teacher Communities to Strengthen Your Teacher Preparation Program</td>
<td>22</td>
</tr>
<tr>
<td>Sunday unique sign-ins</td>
<td>4</td>
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<tr>
<td>How to Start a Regional PhysTEC Network in Your State</td>
<td>17</td>
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<tr>
<td>Periscope: Looking into Learning in Best-Practices Physics Classrooms</td>
<td>33</td>
</tr>
<tr>
<td>STEP UP Ambassador Program Workshop</td>
<td>15</td>
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<tr>
<td>Lessons Learned in the Robert Noyce Scholarship Program: Winning and Servicing the Grant</td>
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<tr>
<td>Cultivating an Inclusive Culture in the Physics Department through a Learning Assistant Program</td>
<td>23</td>
</tr>
<tr>
<td>Share-a-Thon: Get the Facts Out</td>
<td>25</td>
</tr>
<tr>
<td>Learning Assistant Post Conference Workshop</td>
<td>26</td>
</tr>
</tbody>
</table>
Recommendations:
- Reorganize use of staff time to cover the registration table throughout the morning and have extra staff on hand for setup and the rush times
- Appoint panel chairs with the authority to facilitate firmly, and provide a session outline with times
- Set up a clear Poster Drop Off and Pick Up location; include poster numbers and take photos
Appendix G: Evaluation Instruments

Instruments

All evaluation instruments include:

- Five Why’s activity
- Session feedback slips
- Session feedback slides
- Protocol for making session feedback slips and slides
- Closing session feedback slide

Many of these are included below as screenshots as well, plus the SurveyMonkey form for closing feedback.

**Opening Session Activity: Five Why’s**

**Facilitation:** Facilitating this activity will take 15-20 minutes. Given a 20-minute timeframe, the facilitator can add five minutes of large group discussion with participants reporting out what they noticed. The table below provides a verbal script that can be used during the activity, with estimated time intervals to keep the activity on track.

<table>
<thead>
<tr>
<th>Time</th>
<th>Activity</th>
<th>Verbal Cues</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Min</td>
<td>Transition</td>
<td>“While I introduce this activity, open up your folders and pull out the sheet that looks like this, and grab a pen...I have extras if you need them...” “Go ahead and answer the first question at the top about why you are here. (current recruiting site, etc.)”</td>
</tr>
<tr>
<td>1 Min</td>
<td>Intro</td>
<td>“This is an activity that we are conducting for evaluation purposes—only evaluators will see what you write. The goal is to give PhysTEC useful information that they can use to improve this event for the future, but we also think you will find it useful for your own work...”</td>
</tr>
<tr>
<td>2 Min</td>
<td>First Prompt</td>
<td>“In the first box, please answer the question: Why did you come to the PhysTEC conference this year?”</td>
</tr>
<tr>
<td>2 Min</td>
<td>Second Prompt</td>
<td>“Next! I would like you to read what you just wrote in the first box and ask yourself...why?...Why is that true? Write your answer in the second box.”</td>
</tr>
<tr>
<td>2 Min</td>
<td>Third Prompt</td>
<td>“Okay, now, I would like you to read what you just wrote and ask yourself...why?...why is that true? Write your answer in the third box.”</td>
</tr>
<tr>
<td>3 Min</td>
<td>Fourth Prompt</td>
<td>“I think you can see where this is going! Go ahead and fill in the last two boxes with your answers to the question ‘Why?’ and follow the chain of reasoning as far back as you can go.”</td>
</tr>
<tr>
<td>3 Min</td>
<td>Discuss</td>
<td>“Now I want to give you an opportunity to discuss your answers with a neighbor...”</td>
</tr>
<tr>
<td>(5 Min)</td>
<td>(Reporting Out)</td>
<td>(Ask volunteers to share what they noticed or discussed.)</td>
</tr>
<tr>
<td>1 Min</td>
<td>Collect Sheets</td>
<td>“Thank you so much for taking part, this is going to be very useful...”</td>
</tr>
</tbody>
</table>
In the future, an “other” option is needed for the ‘type of institution’ item.

**PhysTEC 2020 – Opening Session Activity**

Please select the type of institute that you represent:

- [ ] Current recruiting site
- [ ] Current comprehensive site
- [ ] Legacy site
- [ ] I am a PhysTEC fellow

The information you provide here will be used for evaluation purposes only. Quotes will only be shared anonymously. Do not write your name on this sheet. Thank you for sharing your thoughts.
Session feedback

We created a simple SurveyMonkey form, as below. The sliders were found to work well for the user, but the automated SurveyMonkey analysis will not provide a histogram of responses. The slips of paper did not work well and would be best to integrate into the program.

![SurveyMonkey form](image)

* 1. How useful was this session?

   - [ ] Not at all useful
   - [ ] Extremely useful

   [ ]

2. What did you like about this session?

   

3. How could this session have been more effective?

   

A different survey was created for each session. In a Pro SurveyMonkey account this could be done instead with Collectors, but the session name would not have been displayed at the top. Each presenter was provided with customized slides, and a slip of paper. Below are instructions for making handout slips and slides.
Protocol for making handout slips and slides:

1) Make a master spreadsheet that holds all the information about each session

2) Make a Monkey Survey for each session
   a) Create a collector and add URL to master spreadsheet
   b) Download a QR code, name the file, then add the filename to the master spreadsheet

3) Design a reminder slip in Word, four slips per page, using mail merge
   a) To include a QR image in mail merge, you need to use INCLUDEPICTURE
   b) Here is the tutorial I used: https://onmerge.com/articleIncludePicture.html
   c) The process is very finicky, here are some things that can trip you up:
      - The pre-merge file needs to be a .doc and NOT a .docx
      - The code cannot be typed in, must use INCLUDEPICTURE menu
      - If the image files are in the same folder as the .doc, no path name needed
      - If the image files are elsewhere, file path must have all // instead of /
      - I think spaces in filenames trip it up, so format like Session2AQR.png
      - Alt+F9 and F9 are both used in the process but, very important:
         (1) Only use Alt+F9 BEFORE the merge (to toggle code/image)
         (2) Only use F9 AFTER the merge (to re-link images)
   d) Post-merge, check each page for layout issues
   e) Two options for unlinking the images to the files so the .docx file can be shared
      - Save as pdf
      - Go to file, in the bottom right ‘edit links to files’, select all, check ‘save picture in document’ box

4) Design a slide in Word, using a 16:9 layout, use mail merge and INCLUDEPICTURE
   a) Follow the same procedure as above, using a .doc and watching F9 use closely
   b) Post-merge, check each page for layout issues

5) Save merged Word file as a .pdf, open in Adobe acrobat pro and split into separate pdfs
   a) Go to tools, pages, split document
   b) Set the number of pages to 1, click ok
   c) Rename individual files

6) Open the powerpoint, which has one slide per session, and save as individual slides
   a) Go to file, share, publish slides
   b) In the dialog, select all, choose a folder to save the individual slides in
   c) Click publish
   d) Rename individual slides
Below is an example of a reminder slip given to presenters to put on the table.

**Session 1: State of PhysTEC Address and PhysTEC Awards Ceremony**
8:00 - 9:45AM | Windows
Speakers: Monica Plisch

Please provide feedback on this session by following the URL below or the QR code on the right. Your input is important.

https://www.surveymonkey.com/r/9NTTL9K

Below is an example of a slide provided to presenters. We found we should have used a forced white background, as some presenters had a template that was black, and the QR code no longer worked.

**Session 1: State of PhysTEC Address and PhysTEC Awards Ceremony**
8:00 - 9:45AM | Windows
Speaker: Monica Plisch

Give us feedback on this session by going to the link below and answering 3 quick questions:

https://www.surveymonkey.com/r/9NTTL9K

You may use a smartphone or web browser

Another option for directing attendees to the feedback surveys would be to include the QR codes and urls in the program itself. That would allow participants to go back and rate multiple sessions later in the day.
Engagement activity

The activity will pose two questions simultaneously, with corresponding colored stickies. First, participants will get to vote on which challenges they face at their home institutions. Second, participants will have a chance to share resources and strategies that they find useful when facing these challenges. Participants engage with the activity during break times. By leaving the installation up for the entire event, we give participants time to process their answers. Periodically, the evaluator can organize the stickies and take photos of the data. At the end of the weekend, the evaluator records the final state of the board, then summarizes the results in a memo to the PhysTEC community.

Closing activity

In the future, an “other” option is needed for the ‘type of institution’ item. This survey was implemented in SurveyMonkey as well for participants who could not attend the closing session. Again, the QR code to the SurveyMonkey version could be included in the program for easy access.
PhysTEC 2020 – Closing Session Feedback

Please select the type of institute that you represent:

☐ Current recruiting site  ☐ Current comprehensive site  ☐ Legacy site  ☐ I am a PhysTEC fellow

What is the thing from the conference that you most want to try, or explore further, when you get back to your home institution?


Did you have any lightbulb moments or changes in your perspective while at the conference?


What is one obstacle that you face back at your home institution, or something you wanted to learn, that wasn’t addressed at the conference?


If you have any other comments about the conference, including notable differences from previous years, please add them to the other side of this page.

If you need to leave the conference early or prefer to respond online, you can do so by using the QR code or URL:
https://www.surveymonkey.com/r/VMYM7SK

The information you provide here will be used for evaluation purposes only. Quotes will only be shared anonymously. Do not write your name on this sheet. Thank you for sharing your thoughts.