Evaluating the Impact of the IRIS EPO Presence at the 2019 NSTA National Convention
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Executive Summary

Annually, the IRIS Education and Public Outreach (EPO) program participates in the national conference of the National Science Teachers Association (NSTA). Through participation in the conference, IRIS seeks to increase the science education community's awareness of the IRIS Consortium and the products and programs that it offers, while also encouraging and enabling post-conference use of IRIS's educational resources. IRIS has three primary approaches to achieve these goals. First, staff work directly with teachers in hour-long in-person professional development workshops. Second, staff promote products and programs as part of share-a-thon sessions. Finally, staff engage in one-on-one interactions with teachers at the IRIS booth on the convention floor. Prior to the 2019 conference, IRIS staff set the following three performance targets for these activities and two impact objectives (Table 1).

The 2019 NSTA conference was held in St. Louis, MO. Attendance at the 2019 NSTA Conference was reported as 6884 attendees (Sheldrake, 2019), which was the lowest of the past six years. IRIS sent three staff to the meeting to lead or co-lead 5 hour-long PD workshops, present three products in 2 share-a-thon sessions, and setup, staff, and dismantle a 10'x10' booth on the convention floor (Figure 1). Overall, these activities were implemented without complication across the multi-day meeting. The performance of IRIS's participation was measured against the performance targets described above.

IRIS's performance and impact metrics for the 2019 NSTA Conference and results.

	Metric	Results
Performance Targets	Reach at least 8.5% of show attendees at the booth or in sessions	IRIS reached 924 attendees or 11.7% of total show attendance. This not only exceeded the 2019 target, but it also exceeded the previous peak for this metric, which was 7.7% of attendees in 2017. This success was driven by the combination of a booth, which reached 8.3% of show attendees, and a suite of 5 one-hour sessions, which reached 3.4% of attendees. Each of these is also a long-term peak reach independently. The increase in reach via the sessions was due in part to a collaboration with UNAVCO and NESTA, which allowed us to present in more sessions.
	Scan at least 2.9% of show attendees' badges for Teachable Moments listserv	Staff scanned 98 badges or 1.4% of show attendees. This is below the performance metric set ahead of the show, despite having a second scanner available for staff. Recommendations for improving in 2020 are described below.
	Maintain costs at or below $20/interaction	The cost per interaction of was $18.33, which was better than the performance metric. Overall costs, at $16,934, were slightly higher in 2019 than the previous two years. However, the reach at the booth and the hour-long sessions spread those dollars over significantly more interactions than had been achieved in previous years.
Impact Objective	90% of attendees of hour-long sessions will indicate the intention to use the featured IRIS resources in their classroom	93% of post-session survey respondents indicated that it was likely (33.7%) or highly likely (58.9%) that they would use IRIS resources presented in the session in their classroom. Thus, IRIS met or exceeded this impact objective and made progress towards increasing both the quantity and quality of seismology education while at NSTA.
	80% of booth visitors spending at least 30 seconds with staff would be able to recognize the IRIS logo and name or identify at least one IRIS resource they intend to explore/use	Exit interviews from the booth found that 100% of participants were able to identify the IRIS logo, were able to identify at least one resource they intended to explore/use later, and were confident (9%) or very confident (91%) in their ability to access the resources from the handout they had received. Thus, IRIS met or exceeded this impact metric and contributed to enhancing the visibility and recognition of IRIS among teachers while at NSTA.

Based on the evaluation of IRIS performance at the 2019 NSTA meeting and comparison of these results to results from NSTAs in 2013-2018, several key recommendations have been identified to continue to improve implementation in 2020.

The anchor of IRIS's presence at NSTA is the booth on the exhibit floor. In 2019, over 570 NSTA attendees explored the suite of free products and programs offered by IRIS during the three days the exhibit hall was open.

Recommendation #1 – Discontinue eblast and experiment with other advertising options

Eblasts have been one of the primary advertising mechanisms to promote the booth and schedule of sessions and share-a-thons to conference attendees. However, this evaluation suggests they have little impact on attendee behavior. Therefore, IRIS should explore other advertising options instead of the eblasts and pair new efforts with an evaluation.

Recommendation #2 – Develop 2021 session ideas prior to the 2020 NSTA meeting and include in the 2020 end of session evaluations

Since session submission for the 2021 NSTA will occur shortly after the 2020 meeting, IRIS should consider creating a list of possible sessions that could be included in the 2020 end of session evaluations where participants could then rank the proposed sessions according to interest. An option for participants to propose their own ideas could still be included.

Recommendation #3 – Tailor titles and descriptions to align with participants' selection practices

To increase the attractive power of sessions, titles and descriptions should be developed in a way that emphasizes that participants will leave with free, fully developed classroom resources, and that the session itself will provide them with opportunities to improve their understanding of the underpinning science and the reasons the instruction is developed and sequenced as introduced. Both factors were shown to be reasons participants selected sessions, in addition to interest in the topic.

Recommendation #4 – Leverage partnerships to maximize the number of hour-long sessions offered, and in turn, reach more attendees.

NSTA limits the number of sessions any single organization can submit. However, based on success of the partnership-approach demonstrated in 2019 with UNAVCO and NESTA, IRIS should actively seek collaborations to extend the number of sessions it is involved in, to five or more annually. In turn, this should increase IRIS's reach without overburdening staff attending NSTA.

Recommendation #5 – Monitor and assess booth placement.

The booth was extremely productive in 2019, reaching 8.3% of show attendees. Unfortunately, the current evaluation was not able to help answer why such reach was achieved, though anecdotal information suggests booth placement (location on the exhibit floor and popularity of booth neighbors) may have been a critical factor. Thus, IRIS should make efforts to more actively monitor the location and performance of the booth to explore if current location criteria can be further optimized.

Recommendation #6 – Scan all hour-long session participants at the door and send follow-up surveys
IRIS failed to meet its performance metric for the percentage of attendees scanned and added to the teachable moment listserv. However, additional scans could be obtained by ensuring that a second IRIS staff member is available to attend the beginning of all hour-long sessions, and scan participants as they enter the room.

Recommendation #7 – Explore the development of a self-scanning station option for the booth
Feedback from IRIS staff suggests that keeping up with the busy flow of traffic at the booth, while also scanning badges is a contributing factor to the low number of scans. This seems to have been limited by how slowly the iPads detected and read the barcodes on participant name badges. To alleviate the pressure on staff, IRIS could explore the development of a self-scanning station for the booth, which if effective, could free staff to talk to other participants.

Recommendation #8 – Repeat the 2017 brand recognition survey
The brand recognition survey conducted in 2017 provided IRIS with a useful baseline of information. This survey should be repeated in 2020 as part of a monitoring effort to identify changes in responses and collect additional information regard perceptions of products and programs.

Background

Annually, the IRIS Education and Public Outreach (EPO) program participates in the national conference of the National Science Teachers Association (NSTA). Through participation in the conference IRIS seeks to increase the science education community's awareness of the IRIS Consortium and the products and programs that it offers, while also encouraging and enabling post-conference use of IRIS's educational resources. IRIS has three primary approaches to achieve these goals.

- Direct work with teachers in hour-long in person professional development sessions
- Promotion of products and programs as part of share-a-thon sessions
- One-on-one interactions with teachers at the IRIS booth on the convention floor

Participation in the NSTA National Convention is also an opportunity for IRIS EPO to receive feedback, directly from teachers about the products and programs it offers, and to gain an understanding of teachers' instructional needs and concerns. While much of this feedback is collected informally through conversations with teachers at the booth, IRIS also uses the meeting to conduct formal evaluations of EPO products and programs with this national teacher audience. This combination of formal and informal feedback informs the development and updating of IRIS products and services.

The 2019 NSTA conference was held in St. Louis, MO. IRIS EPO sent three staff to the meeting to deliver five hour-long PD workshops, present three products as part of two share-a-thon sessions, and setup, staff, and dismantle a 10'x10' booth on the convention floor. The efficacy of IRIS's participation was measured against the following performance targets and impact objectives. Both were developed prior to the meeting based on prior performance at previous NSTA meetings (2013 - 2018) and actual activities planned for 2019 (e.g. number of sessions, number of scanners, etc.). At the 2019 NSTA National Meeting, IRIS EPO Staff will achieve the following performance metrics.

- reach at least 8.5%* of show attendees at the booth or in sessions,
- scan at least 2.9%** of show attendees' badges for Teachable Moments/IRISEd, and
- keep costs at or below $20/interaction.

IRIS also defined the following impact objectives for the 2019 NSTA Conference.

- 90% of attendees of hour-long sessions will indicate the intention to use the featured IRIS resources in their classroom.
- 80% of booth visitors spending at least 30 seconds with staff would be able to recognize the IRIS logo and name or identify at least one IRIS resource the intend to explore/use.

Both are aligned to longer-term outcomes identified in the Logic Model (Figure 1) for attending NSTA which have the following imbedded assumptions.

1. Reaching more teachers while at NSTA will increase the quantity and enhance the quality of seismology education if the teachers reached use IRIS resources
2. Reaching more teachers while at NSTA will increase the visibility and recognition of IRIS if the IRIS logo is featured and IRIS is explained.

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*Previous attendee reach averaged 8.3% with a max of 10% and a minimum reach of 7.2% of attendees.

**In 2018, the only prior year with two badge scanners, 2.8% of attendees were scanned by IRIS staff.

***In 2017 and 2018 conferences, the cost/interactions were both below and above this threshold respectively.

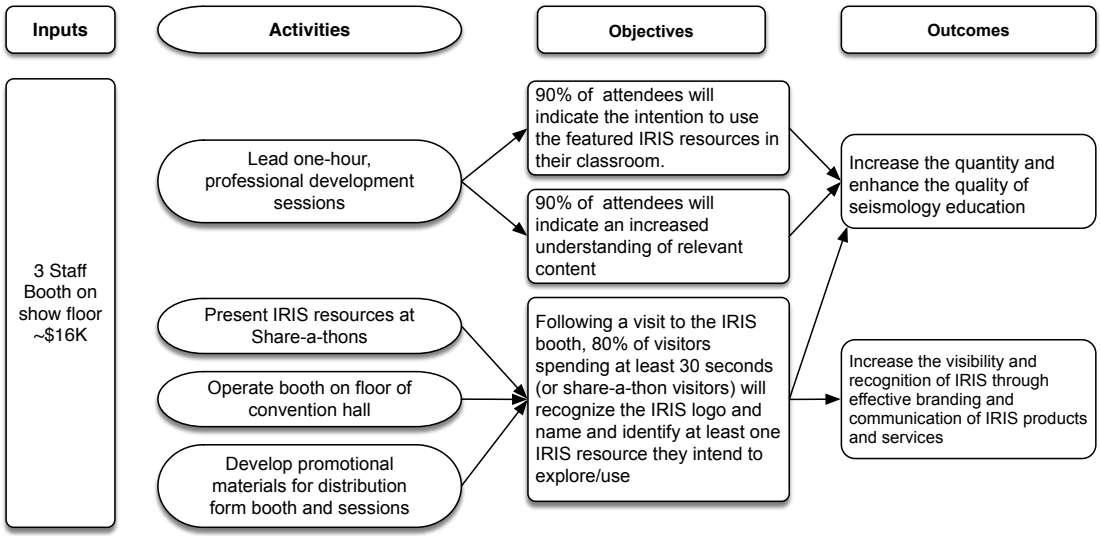

Figure 1: Logic model for IRIS's work at the national NSTA conference.

Pre-Show Promotion

Prior to NSTA, IRIS promoted its sessions and booth with targeted messaging sent directly to attendees that taught Earth, Physical, and/or General Science at the middle or high school levels. The eblast (Appendix A) was sent on a Monday, 10 days days prior to the start of NSTA. A second, duplicate eblast was sent on a Sunday, 5 days prior to the start of NSTA. This is a paid service provided by NSTA, but the content of the eblast was designed by IRIS EPO staff.

IRIS also used Twitter and Facebook to promote IRIS's presence at NSTA. Posts on both platforms appeared a few days prior to NSTA announcing that IRIS would be at NSTA. Then, daily posts were made during the show to promote the booth's location at NSTA and the daily schedule of IRIS sessions (Appendix G). Because social media accounts are free, the cost of such adversiting is only the effort required to create the content and push the information. In this case, all content was already created so the time investment was negligible.

This year, both eblasts and social media posts included the description of the opportunity to enter to win an $100 PocketLab One sensor (https://www.thepocketlab.com/store/pocketlab-one). To enter, attendees had to stop by the booth and mention the email for social media posts. Signage promoting the raffle was intentionally absent from the booth so we could use the raffle as a tool to track the effecacy of social media and eblast advertising (see Evaluation below) .

Hour-Long Sessions

Hour-long sessions provide an opportunity for IRIS EPO to contribute to the content knowledge and pedagogical content knowledge of participants. Sessions are designed such that participants can learn new content while gaining direct experience using the featured IRIS resources. This allows, teachers to confidently implement the activity when they return to their classrooms. In the session, participants not only receive relevant handouts for the lesson, but they also receive the IRIS Earthquake Resource handout (Appendix B). This handout provides an overview of the spectrum of resources IRIS offers beyond what is covered specifically in the workshop.

In 2019, IRIS submitted three proposals to run one-hour workshops within the agenda of the National NSTA meeting. Two addition session proposals were submitted by UNAVCO, with IRIS as a partner, to

the National Earth Science Teachers Association's (NESTA) allocated slots at the meeting. This strategy proved to be an effective way to obtain as many sessions as possible while complying with NSTA's three submission policy. In 2019, all three IRIS proposals were accepted as well as the two joint sessions with UNAVCO via NESTA.

Bring NASA's Seismic Data from Mars to Your Classroom!
Explore data from the first seismometer on Mars! Learn about Mars' interior using IRIS's free software, lessons, and data from NASA's InSight mission.
Presenter(s): Tammy Bravo (IRIS: Washington, DC), Sarah Marcotte (NASA Jet Propulsion Laboratory: Pasadena, CA), Carolina Carnalla Martinez (NASA Jet Propulsion Laboratory: Pasadena, CA)

Accounting for Uncertainty in Scientific Argumentation
Uncertainty is an important part of scientific discourse, yet often overlooked in the classroom. Explore a simple heuristic to incorporate uncertainty into students' argumentation.
Presenter(s): Michael Hubenthal (IRIS: Washington, DC), Michael Gallagher (Science Teacher: Sewickley, PA)

NESTA, UNAVCO, and IRIS Session: Are Earth's Plates Really Moving? Explore Earth Science Data
Explore and quantify plate motions and investigate models to support observations! Investigate IRIS earthquake and UNAVCO GPS data to determine the direction, rate, and type of plate boundaries, while exploring various models to support these observations.
Presenter(s): Shelley Olds (UNAVCO: Boulder, CO), John Taber (IRIS: Washington, DC)

After an Earthquake: Real-Time Earthquake Data as a Hook to Encourage Answer-Seeking about the Geologic and Societal Context of the Event
Hook students into Earth science after major earthquakes! IRIS's suite of free classroom products, data, animations, and visualizations are the foundation for your learning cycle.
Presenter(s): Michael Hubenthal (IRIS: Washington, DC), John Taber (IRIS: Washington, DC)

NESTA and UNAVCO: Hands-On Demonstrations and Models for Your Earth Structure, Earthquake, and Plate Tectonics Unit
Explore UNAVCO's collection of inexpensive physical models, which support students' understanding of abstract earthquake/plate tectonics-related concepts. Scientific practices and crosscutting concepts will be emphasized.
Presenter(s): Shelley Olds (UNAVCO), John Taber (IRIS)

Share-a-thons

Share-a-thons are opportunities to informally introduce a large number of teachers to a single resource in a short amount of time. To accomplish this, presenters distribute themselves at tables around the perimeter of a large meeting space. Attendees then circulate around the room and visit as many tables as possible in any order they wish. Once a small group of teachers has gathered, presenters introduce a single resource in 3 - 5 minutes. At the conclusion of each presentation, presenters distribute a handout that allows the audience to get more information on the resource at a later time. These mini-presentation are repeated continuously until the conclusion of the session or until all session attendees have visited all the

presenter tables. The fast-paced format of share-a-thons does not allow for much impact beyond piquing the interest of participants and providing them with a handout to learn more.

In 2019 IRIS participated in two share-a-thons. Table 1, below, illustrates the resources presented in each share-a-thon as well as the number of EPO staff that presented. To help attract the attendees' attention, IRIS EPO staff brought a single pop-up banner stand to place behind the presenter table. This year, IRIS staff also distributed an additional handout, the IRIS Earthquake Resource handout (Appendix B), which provides an overview of the spectrum of resources IRIS offers beyond the resourced featured by the presenter.

Table 1: IRIS participation in share-a-thons at the 2018 NSTA National Meeting

Share-a-thon	Staffing	Resources presented
NESTA Earth System Science	1	Station Monitor
Meet in the Middle	2	5-Slinky Model & Seismic Waves viewer

Booth

A 10'x10' corner booth is the core component of the IRIS presence on the convention floor at NSTA. As illustrated in Figure 2, the booth consists of three pop-up banners, which span the back of the booth, plus a large monitor that loops a slideshow of IRIS's educational resources (e.g. 10 to 12 slides). On a side counter, a touch screen computer highlights digital resources, while a physical model (e.g. the earthquake machine) is ready for demonstrations. A main demo screen and laptop, along with handouts, are positioned on the front counter. This year, the monitor on the side counter featured the IRIS Earthquake Browser (http://ds.iris.edu/ieb/) and various animations each day. Screens on the front counter featured the Seismic Waves Viewer (http://ds.iris.edu/seismon/swaves/) on one and jAmaSeis (http://www.iris.edu/hq/inclass/software-web-app/jamaseis) with a real-time data stream, on the second. IRIS staff also hand out several items to teachers who stop by. These giveaways include the "Earthquakes... Like Ripples on Water?" poster (https://www.iris.edu/hq/inclass/poster/earthquakes_like_ripples_on_water) , plastic Slinkys, IRIS stickers, "Shaking Up Earth Science" name badge ribbon, the IRIS Earthquake Resource handout outlining IRIS resources relevant for teachers (Appendix B), and a handout listing IRIS sessions throughout the show.

Figure 2: IRIS staff set up the booth at the 2019 NSTA convention in St. Louis, MO

Staff who work at the booth at NSTA have been trained to use the following dialogue when meeting teachers who approach the booth. The goal of the dialog is to identify a need the teacher has, introduce them to IRIS, and highlight one or two resources that are likely to meet their needs, and ensure the teacher understand how to access the resources.

Greet – "Hello"

Welcome – "Welcome to our Booth. My name is XXXXXX…"

Meet – "…and you are?"

Discover – "So what brings you here?" or "I saw you were looking at the screen, do you teach about earthquakes?" *It is not about what you tell… it is what you ask!*

Organization – Point out the logo. "IRIS is a facility for seismological research that is funded by the National Science Foundation. Through our education and public outreach program we produce a variety of free educational resources for teachers and their students."

Products - All of the above should occur before you start talking about products…
Less is more as they are probably on information overload.
IEB/3DV or Earthquake Channel, OR Station Monitor and/or jAmaseis, OR Animations

Use one of three products as an example of what we offer…
Closing –
1. Scanning their badge for IRIS Teachable Moments list
2. Provide the IRIS Earthquake Resource handout (Appendix A) marking resources discussed.

Implimenting Recommendations from 2018

The post 2018 NSTA evaluation report (Hubenthal, 2019) made six recommendations based on the results of the 2018 evaluation (Table 2). All recommendations were carefully considered and prioritized by EPO staff, and many were implemented at the 2019 NSTA as illustrated in Table 2.

Table 2: Recommendations from the post NSTA 2018 evaluation report and the corresponding programmatic response for 2019.

2018 RECOMMENDATIONS	2019 RESPONSE
Reflect on/re-set performance targets to account for variability in NSTA attendance	To better account for variability in show attendance, the 2019 performance metrics were revised to percentages of the show attendance rather than raw counts.
Develop additional eblast effectiveness measures	A raffle was announced in only eblasts and social media posts. The numbers of entries and how they heard about the raffle were tracked at the booth.
Continue impact evaluations and explore possible follow-up surveys	Impact evaluations were continued in 2019 and a follow-up survey was developed. However, email addresses were not collected in individual sessions which unfortunately, made the follow up survey unusable.
Find alternatives to traditional share-a-thons	Staff were on the lookout for alternatives, but they only ones that seemed to be options were advertiser sessions.
Offer sessions informed by teacher feedback	Delayed until 2020. Unfortunately, session proposals are due nearly a year in advance. Thus, by the time the teacher feedback was compiled, the sessions for 2019 were already submitted.
Reduce costs and limit staffing to three, unless local	Staffing was limited to only three staff for 2019.

Evaluation Methods

Pre-Show Promotion

The evaluation of the pre-show promotion focused on gathering data on how much attention the two pre-show promotion platforms, eblasts and social media posts, garnered for IRIS. The reach of the eblasts

is reported by NSTA, who maintains the email servers disseminating the eblasts, in two formats. The first is the "open rate" or the number of recipients who received the email and loaded it in their mail client. The second is the "click-through rate" or the number of users who clicked on an embedded URL in the email to access the linked content.

Similarly, the audience of IRIS social media was measured through metrics reported by the platforms used. From Facebook, we report "Reach" and from Twitter we report "Impressions." While both provide a metric for the potential audience, they do differ and therefore cannot be directly compared. For example, Facebook reach is the number of *unique* people who saw your content, while Twitter impressions are not limited to unique people. Rather, Twitter impressions represent the number of times a Tweet is served in timeline or search results.

Measuring the impact or ability of these pre-show promotions motivate recipients to act, relied on multiple measures. For Facebook, the interaction rate was determined by dividing the number of Interactions (e.g. times individuals interacted with the content by "liking" or "sharing" a Facebook post) by the Reach. For Twitter, the Engagement rate was determined by dividing the number of Engagements (e.g. time individuals retweeted, replied, followed, etc. a tweet) by the number of Impressions. More concrete actions were also measured. For example, the exit interview for the booth (Appendix J) contained an item which asked participants "Did you see or receive this email announcing the IRIS Booth (image of eblast included)?" Next, the number of people who stopped at the booth an asked to sign up for the raffle (only promoted via eblasts and social media) were recorded along with how they heard about the raffle. Finally, the hour-long session evaluations (Appendices D - H) included an item that asked participants "How did you first heard about the session?" with email and social media offered as responses as sessions were advertised on both platforms.

Hour-Long Sessions

The evaluation of hour-long sessions sought to answer two key questions; How large was the reach of the workshop (e.g. how many people attended)? How did the workshop impact participants (e.g. how did their Behaviors, Attitudes, Skills, Interest, and/or Knowledge change as a result of participating)?

The reach of the session was measured by conducting head counts shortly after each session began. Since there is some ebb and flow in participation (some teachers arrive late while others leave early), a second head count was taken later in the workshop. When possible, staff attempted to document headcounts with photographic evidence (Appendix C). Attendance is also tracked by the difference in the number of handouts brought to the session compared and the number remaining at the end of the session. Since each approach has its own shortcomings (e.g. coming and goings of participants, and people potentially taking extra handouts or not taking any at all) the evidence is triangulated to arrive at a reasonable estimate that the program can have confidence in.

To answer the question of impact, two post-session evaluations were employed. First, an externally conducted session evaluation was facilitated by NSTA for all sessions in the conference. This online evaluation is available to conference attendees up to a week following the conference. NSTA then compiles the results and provides them in aggregate to presenters several weeks following the conference. IRIS supplements this extern al survey by administering its own post-session evaluation (Appendices D - H). Each was distributed, in hardcopy, to session participants 5 minutes before the conclusion of the session, so participants had time to complete the evaluation before leaving for their next session.

Share-A-Thons

Unlike workshops, share-a-thons are designed to quickly interest teachers in a resource and provide them with a way to follow up at a later time. Given this, we have determined that the most efficient method to measures a share-a-thon is by monitoring reach alone. In the past, the program has attempted to count the teachers who come up to the table. However, if the session is well attended, this can be difficult as teacher come and go continuously. Thus, an estimate of reach is determined by carefully counting the number of handouts prior to the session. During the share-a-thon staff attempt to only disseminate only one-handout to each teacher who watched the mini-presentation. Then, following the share-a-thon, staff count the number of handouts they have left. The difference is reported as reach.

Booth

To estimate the reach from the booth, staff uses pocket clickers to count conversations with attendees. Staff were instructed to record the time and date they started and ended counting on a clipboard in the booth. Then, they were to "click" once for each person that they engaged with during this time period. For the purpose of the evaluation, engagement at the booth was defined as conversation in which EPO staff provided an attendee with more information about IRIS, and/or resources attendees might use as part of their instruction. These engagement counts provide a snapshot of the traffic at the booth within a given time window. Using these snapshots from across the day, we calculated an average number of interactions/hour for the booth on each day. This daily interaction average can then be multiplied by the number of staff hours that are scheduled for each day worked at the booth to generate an estimated daily reach. The scheduled staff hours give a conservative estimate as it is common for staff to work more hours than scheduled in the booth each day. Daily reach can then be summed across all days the booth is open, to obtain a total estimated reach from the booth.

In addition to counting booth interactions, an external evaluation of the booth was conducted to deepen IRIS understanding of the booth experience for visitors and to measure the impact of the booth on attendees. In addition, the evaluation also explored who visits the IRIS booth, what brought visitors to the booth, how their booth experience was. The evaluators selected a convenience sample of 22 attendees who spent at least 30 seconds or longer interacting with IRIS staff at the booth. Each was asked a series of questions from the post-visit semi-structured interview guide and responses were recorded as fieldnotes by the evaluators (Appendix J).

Results

Pre-show promotions - Reach

This year's eblasts were sent to NSTA registrants who taught Earth, Physical, and/or General Science at the middle or high school levels. As illustrated in Table 3 below, there were fewer registered participants who met our inclusion criteria in 2019, who also made up a smaller percentage of the show attendance.

Table 3: Reach of IRIS's email marketing campaign promoting IRIS's booth and sessions at the NSTA Conference 2017 - 2019.

Year	Show Attendance	Count of Eblast Recipients (% of Show Attendance)	Open Rate	Click-Through Rate
2019 (10 days prior)	6884	2298 (33.3%)	29.7%	1.3%
2019 (5 days prior)	6884	2335 (33.9%)	38.0%	0.7%
2018 (10 days prior)	7832	2889 (36.9%)	35.9%	0.9%
2018 (5 days prior)	7832	2982 (38.1%)	34.4%	0.6%
2017 (Several days prior)	9511	3516 (37.0%)	37.2%	0.4%

According to NSTA, who reported the statistics for the eblast via email correspondence, 29.7% and 38.0% of the 2019 eblasts were opened. The 2019 rates are both higher than average for email marketing campaigns within the industry sector of education/training clients specifically (21.8%) and email marketing campaigns generally (21.6%) (MailChimp, 2018). However, this rate is higher than what was found in the 2019 post-both visit interview data. Here, only 18% of interviewees, when shown the eblast, reported having received the email and many noted that they received too many emails from NSTA and disregarded them.

While up compared to previous years IRIS eblasts continue overall to result in a low click through rate. However, this rate is still significantly lower than the average click-through rate (2.5%) for the industry sector of education and training clients (MailChimp, 2018). The low click-through rate may be explained by the structure of the eblast (Appendix A), which contains all relevant information in the email itself and does not require recipients to "click-through" for more details.

Coordinated posts on Facebook and Twitter (Appendix J) were also used to advertise and promote the IRIS booth and sessions at the 2019 NSTA Conference. As illustrated in Table 4, each Faceboook post was displayed over 1000 times but had relatively little engagement (e.g. liking, clicking on a link, etc).

Table 4: Reach of IRIS's Facebook campaign promoting IRIS's booth and sessions at the 2019 NSTA Conference.

Proximity to NSTA	Impressions	Engagement	Engagement Rate
>2 weeks prior	1304	32	2.5
3 days prior	1042	21	2.0

Posting to twitter began more than 2 weeks ahead of NSTA and included 27 separate tweets. Tweets came in two flavors (a generic post about the booth) and specific tweets promoting individual IRIS sessions (Appendix G). As illustrated in Table 5 below, the number of users' timelines that contained IRIS tweets (Impressions) varied considerably. However, the greatest reach correlated most closely with tweets that contained a gif in them.

Table 5: Reach of IRIS's Twitter campaign promoting IRIS's booth and sessions at the 2019 NSTA Conference.

Date	Impressions	Engagement	Engagement Rate	Tweet Type
>2 weeks prior	1297	22	1.7	
>2 weeks prior	1330	10	0.8	
>2 weeks prior	1984	29	1.5	
10 days prior	1127	9	0.8	
9 days prior	1142	11	1	
3 days prior	1296	19	1.5	
1 day prior	770	3	0.4	
During	2449	50	2	gif
During	5538	93	1.7	gif
During	1059	20	1.9	gif
During	942	10	1.1	
During	1210	13	1.1	

During	2258	50	2.2	
During	1018	8	0.8	
During	4965	152	3.1	gif
During	2840	62	2.2	gif
During	1038	13	1.3	
During	1132	7	0.6	
During	1693	64	3.8	gif
During	933	9	1	
During	3569	135	3.8	gif
During	1194	7	0.6	
During	2626	72	2.7	gif
During	903	6	0.7	
During	1639	36	2.2	gif
During	3145	127	4	gif
During	5010	161	3.2	gif

Excluding staff time, the cost for preshow advertising was $1958 for 2019. This cost was all eblast as social media costs are minimal as most content is already created and staff time to make the posts is negligible. For this investment we estimate that we reached 34% of our target audience (teachers who identify as delivering Earth science instruction), or ~890 attendees. Given the reach, the cost per person was up for 2019 ($2.20/person), which is up from 2018 ($1.62/person).

Pre-show promotions - Impact

Several lines of evidence suggest that the pre-show promotions used have very little impact on teacher behavior. First, as illustrated in Tables 4 and 5 above, engagement rates (people actually interacting with the content) of social media content were low. Next, only three teachers came to the booth and mentioned the raffle and asked to enter to win the $100 prize (two reported seeing the eblasts and one saw the announcement via Twitter). While it is possible that the prize offered wasn't enough to motivate teachers to seek out our booth and remember to enter the raffle while at NSTA, this low response correlates well with the results from the booth exit interviews (Appendix J), which found that only 30% of 2018 and 2019 visitors had seen the eblasts and none had seen any tweets. In 2019, a follow up question found that many visitors reported receiving lots of NSTA eblasts prior to the show and ultimately the delete these without paying much attention to them. Similarly, as described in Appendices D – H, only one attendee reported first learning about the hour-long session they attended through social media and none first learned about the session via an eblast .

Hour-Long Sessions

The combined session reach for the 2019 NSTA was estimated at 232 teachers. Each hour-long session, facilitated or co-facilitated by IRIS, was attended by at least 20 or more participants. The attendance of three sessions was above the long-term session average of 36 people, as illustrated in Figure 3. The session with the largest attendance in 2019 was NASA's mission to Mars (InSight) which had an estimated attendance of 75 teachers.

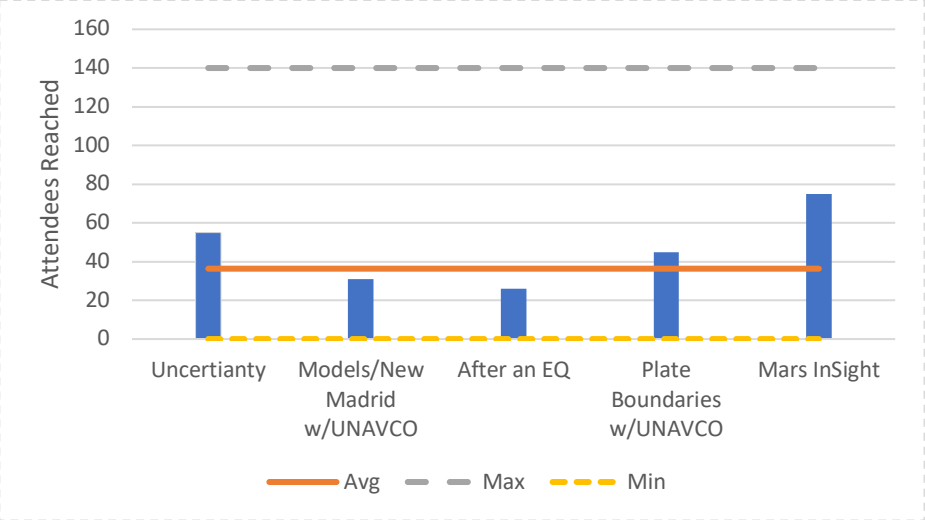

Figure 3: Reach of IRIS's hour-long sessions as part of the 2019 NSTA National Convention. Blue bars illustrate reach for each 2019 session, while lines represent the maximum (grey dashed), minimum (yellow dotted) and average (orange solid) reach from previous sessions held at NSTAs from 2013-2018.

Based on session evaluations, 94.4% of participants identified the conference program as the primary way that participants learn about IRIS sessions. This is consistent with results from the 2018 session evaluations (Hubenthal, 2019). Participants indicated that they had multiple reasons for selecting the IRIS sessions. For example, the most frequent reason for selecting an IRIS session was because the topic sounded interesting (28.2%). However they also indicated a desire to get resources for their classrooms (24.4%), improve their pedagogical content knowledge (19.5%), or content knowledge (16.6%). Interestingly only 7.3% of attendees indicated they selected the session because they are familiar with IRIS and its products/resources.

IRIS's sessions were well received by attendees. For example, across all sessions, 99% of respondents agreed (28.0%) or strongly agreed (70.7%) that the session was a valuable use of their time. Sessions also appeared to meet participant expectations related to session selection. Here, 93% of participants across all sessions indicated that it was likely (33.7%) or highly likely (58.9%) that they would use IRIS resources presented in the session in their classroom. This is above the impact objective, "90% of attendees of hour-long sessions will indicate the intention to use the featured IRIS resources in their classroom", set for hourlong workshops prior to NSTA. Teachers also indicated that their interest in, and their knowledge of the topics of the sessions increased (Figure 4). And, in a related measure, these increases were applicable to their classrooms as 99% of participants agreed (29.6%) or strongly agreed (69.1%) that they would be able to include some of what they learned in the session in their own work. Indicative of participants' perceptions of the quality of the instruction and resources they received across all IRIS sessions, 95% of respondents agreed (28.8%) or strongly agreed (66.3%) that they would recommend IRIS resources to a colleague. Complete details for each session's evaluation can be found in Appendices D through H.

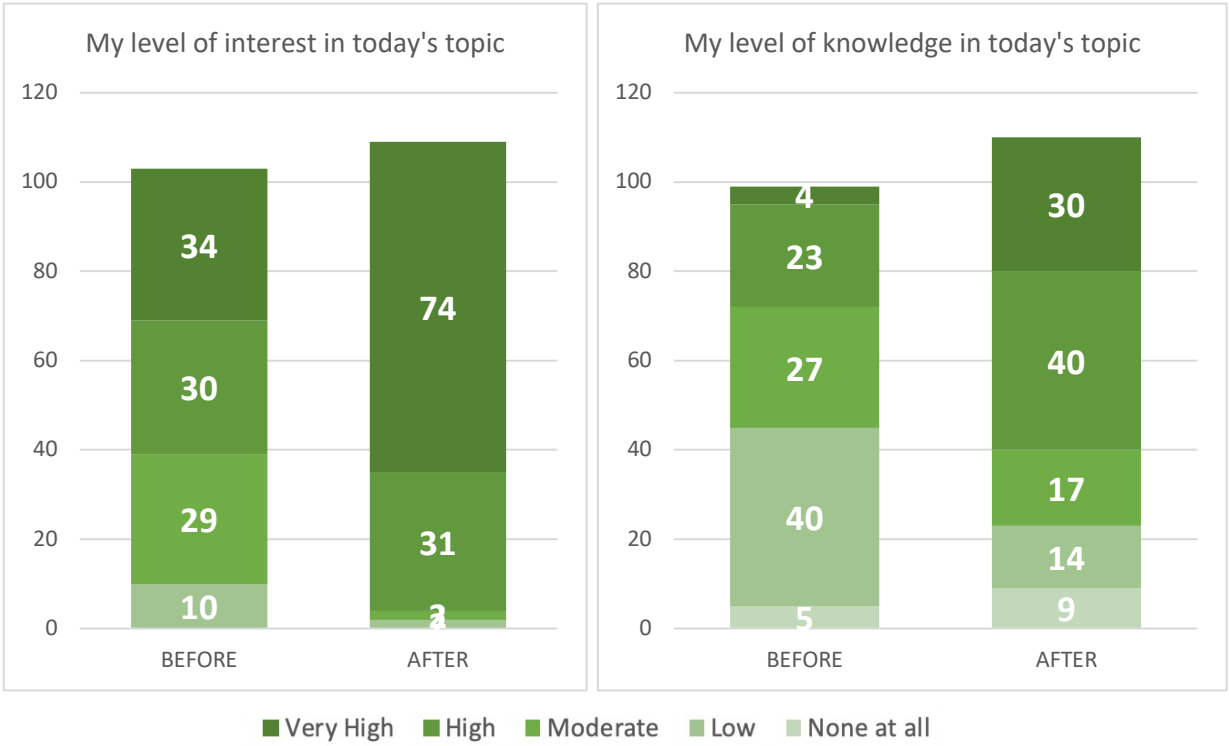

Figure 4: Participants' degree of interest in and knowledge of the topics of all five session as measured both before (measured retrospectively) and after the session. Due to confusion caused by the formatting of the survey, a small number of respondents only provided post responses.

A number of participants across the sessions proposed possible topics for IRIS to present at future NSTA conferences (Table 5). While many of these are outside the scope of IRIS's content expertise, topics such as earthquake early warning, the relationship between earthquakes and other natural hazards such as volcanoes and tsunamis, and plate tectonics are suggestions IRIS could develop sessions for.

Table 5: Topics participants, in all three one-hour sessions, would like to see IRIS offer at future NSTA conferences and the frequency they were proposed

Topic	*Frequency*
Volcanoes and earthquakes. Yellowstone?	3
Induced Seismicity	3
Earthquakes and their causes	3
Plate tectonics/Plate boundaries	3
Seismic data and analysis. Physics integration?	3
Elementary school resources	2
Ocean floor features & Costal Erosion	2
Seismic engineering of buildings and hazards	2
Earth structure	2
Ancient faults and interplate seismic activity	1
Tsunamis	1
More about Mars and its interior	1
The evolution of Earth's landmasses over geologic history	1

Share-A-Thons

IRIS participated in two share-a-thon sessions and ran two presentations in one of the sessions. Through these share-a-thon presentations, IRIS staff reached an estimated ~40 teachers per share-a-thon, for 120 teachers in total. This per presentation reach is just above the historic average of 39 teachers per share-a-thon presentation. Importantly, this represents an upswing in share-a-thon reach as

IRIS's share-a-thon reach, especially for NESTA share-a-thons, has been declining over the past 6 years (Figure 5).

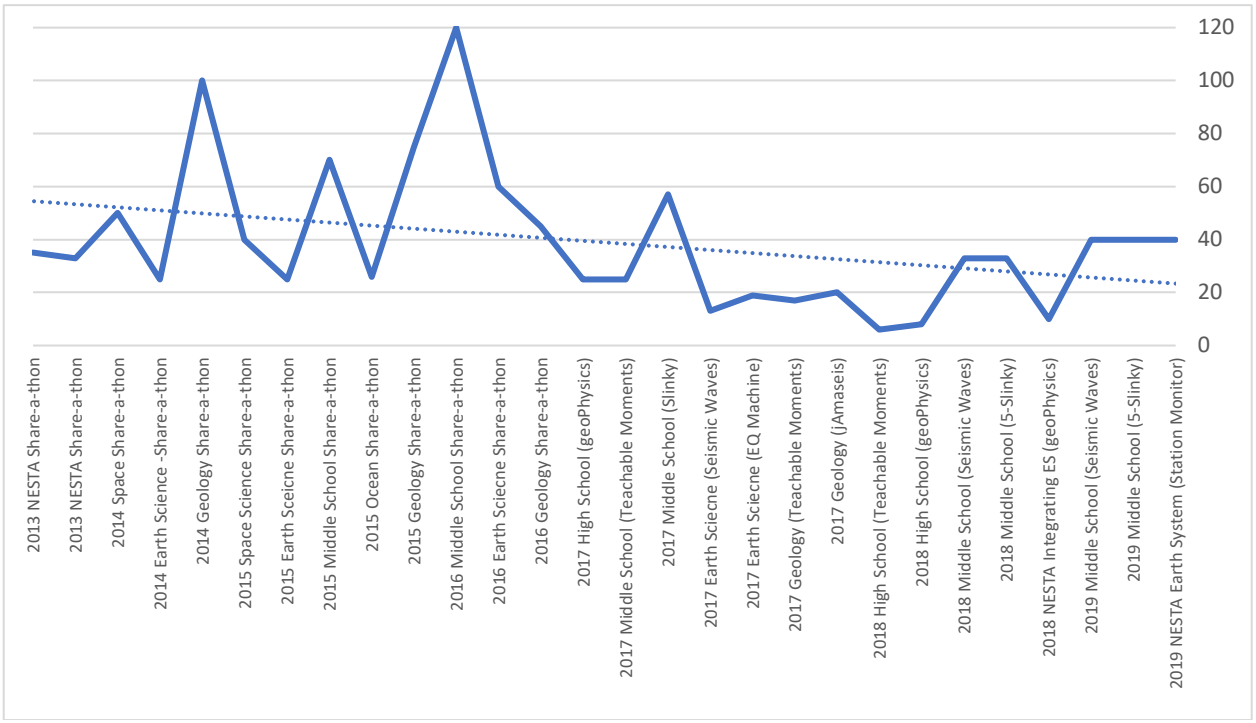

Figure 5: The number of teachers reached through IRIS's participation in share-a-thons (2013 to 2019) by session. The trend indicates an overall decline in teacher participation in share-a-thons. However, some share-a-thons, such as the Middle School share-a-thon have been able to maintain larger attendance than others .

Booth

As illustrated in Table 6 below, staff counts of interactions at the booth, or reach, suggest that approximately 572 attendees were engaged at the booth across the three days of the show. This year the first day of the show was the busiest of the three days. Historically, the second day of the show tends to be the busiest for us. However, our booth happened to be placed next to a book distributor who was giving away copies of the book written by the NSTA convention's keynote speaker and a free book to each teacher throughout the show. Thus, the heavier than usual traffic on the first day could reasonably attributed to this favorable booth positioning.

Table 6: Estimates of the number of attendees who interacted with EPO staff at the IRIS booth on each day the convention hall was opened. Estimates are based on averages of staff counts and the staff hours scheduled for each day.

	Staff Hours	***Avg. Interactions/Hour***	***Estimated Reach***
April 11, 2019	15	18.9	283
April 12, 2019	14.5	11.9	173
April 13, 2019	6.5	17.9	116
Estimated show total	36	16.0	572

Compared to past NSTAs, the 2019 estimated booth reach is tied with 2014 for the largest booth reach since IRIS began tracking such data. This is notable as the 2019 NSTA conference had the smallest overall attendance at 6884 since IRIS began tracking such data (Sheldrake, 2019). As a result, when booth reach is normalized for total show attendance, as shown in Figure 6, we find that the 2019 reached the largest percentage of show attendees.

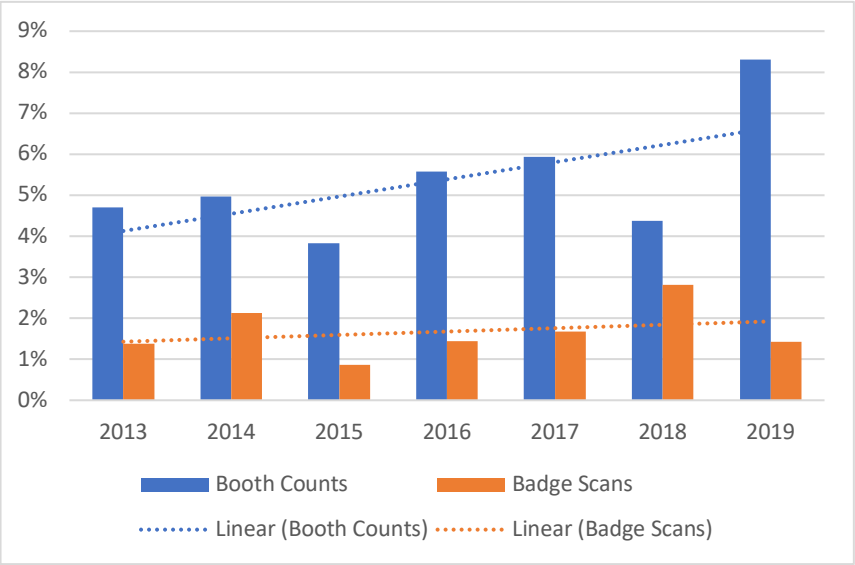

Figure 6: The percentage of NSTA conference attendees who interacted with EPO staff at the IRIS booth as measured by booth counts (blue), and the annual percentage of NSTA Conference attendees whose badges were scanned by IRIS EPO for the Teachable Moment listserv (orange). Linear trends (dashed lines) indicate that the booth has become increasingly effective over time.

An additional measure for the booth's impact has been the number of attendees who had their badges scanned to add them to the Teachable Moments listserv. In 2019 only 98 attendees had their badges scanned despite having two badge scanning devices available. This count is down from previous years and as illustrated in Figure 5, it is among the lowest percentage of show attendees scanned since 2013.

As noted above, an external evaluation of the IRIS booth, initially implemented in 2018, was repeated in 2019 to continue to determine if the booth achieves its impact goals and gain additional insights into the booth's operation. The evaluation (Appendix H) consisted of semi-structured interviews with 21 attendees who spent at least 30 seconds at the booth talking with IRIS staff. Similar to 2018, participating visitors had a wide range of teaching experience (1 to 34 years), but the average was 14 years of service. Participants taught primarily at the middle school (59%) and high school (32%) levels. Earth Science was the primary teaching responsibly for the largest group of participants (37%), followed by Integrated/General Science for 18% of participants.

When asked what attracted them to the booth, a range of factors were reported by interviewees. Common themes were identified from 2018 and 2019 in illustrated in Table 7. While there was some consistency across the two years, the most frequently reported element did vary. Several were

Table 7:Participant responses and their frequency to the question, "What attracted you to stop at the booth?"

	2018 (n=31)	***2019 (n=21)***	***Total (n=51)***
Heard about it in a session	1	6	7
Slinky	1	5	6
Natural hazards calendar	-	4	4
Signs for Earthquakes	3	3	6
Heard about/used resources before	4	2	6
Seismic data/activity evidence	2	2	4
Interested/teach topic	2	2	4
Posters	2	0	2
Listserv	2	0	2
Animations	2	0	2
Popup graphics	0	1	1
Other	1	0	1

consistent with reporting from the 2018 interviews, while others, like the Natural Hazards calendar were new in 2019. While not named specifically as a reason for stopping at the booth, IRIS's eblast was recognized by 4 of the 2019 participants. However, follow-up questions about the eblast revealed that most interviewees said they were getting so many emails from NSTA that they stopped looking at them.

All twenty-one participant visitors were able to identify the IRIS logo (Table 8) with 11 of those indicating they learned about the logo while visiting the IRIS Booth. All of those interviewed (100%) reported learning about one or more resources they intend to use or explore and the interviewees were confident (9%) or very confident (91%) in their ability to access the resources they identified later, indicating the resource on the resource handout they had received (Appendix A). This is above the impact objective, "80% of booth visitors spending at least 30 seconds with staff would be able to recognize the IRIS logo and name or identify at least one IRIS resource the intend to explore/use.", set for the booth prior to NSTA. Importantly, all (100%) of participants expressed the understanding that what IRIS offers is free, and all participants (100%) would recommend IRIS educational resources to a colleague. When asked what they would say to a colleague about IRIS resources, they noted that it is a great website with resources that are free and that it can be used in support of what they are doing.

Table 8: Number of interviewees from the 2018 and 2019 booth exit interview that indicated that they had heard of or seen the organization before.

	2018 (n = 30)	2019 (n = 21)	Total (n= 51)	Total (%)
NASA	29	21	50	98.0%
USGS science for a changing world	28	19	47	92.2%
IRIS	24	21	45	88.2%
NSF	--	17	17	81.0%
earthscope	9	1	10	19.6%
UNAVCO	0	1	1	2.0%
SCIEC AN NSF+USGS CENTER	0	0	0	0.0%

Costs

The cost for IRIS EPO's participation at the 2019 National NSTA Convention totaled just under $17,000, excluding staff time. This is above both the 2017 and 2018 show costs, which were $16,096 and $16,279 respectively. As illustrated in Table 9, the largest single expense category for participation in NSTA continues to be staff travel, which makes up roughly 30% of the total. However, having a booth at the show takes up over half the total NSTA budget as the booth space is 31% of the total and shipping, which is mostly the booth, is an additional 28%. The remainder of costs are relatively small. The 2019 cost

Table 9: IRIS EPO's participation costs for the 2019 NSTA Convention

Category	Cost	Percentage
Booth	$ 5,283.20	31%
Shipping	$ 4,678.08	28%
Printing	$ 214.71	1%
Advertising	$ 2,059.80	12%
Staffing	$ 4,698.83	28%
Total	$ 16,934.62	100%

per interaction can be calculated using the following formula. Total cost / Total reach = Cost per Interaction or $16,934.62/(572 [booth] + 120 [share-a-thon] + 232 [workshop]) = $18.33/attendee reached. While the total show cost is slightly higher than the past few years, the cost per interaction is below the target performance metric set prior to the show and the metric was achieved.

Summary and Recommendations

IRIS staff had a busy week at the 2019 National NSTA convention with a booth presence in the exhibit hall, facilitation of five hour-long sessions, two of which were jointly run with UNAVCO, and delivering three share-a-thon presentations. IRIS's approach towards evaluating these varied activities continues to provide a robust, yet conservative estimate of the reach, insights into how and to what degree participants are impacted, and additional information that allows IRIS staff to make adjustments to the approaches and offerings used that are based in data. As described above, the vast majority of attendees reached through the staff's work perceived both the work and the products produced by the EPO program as of high-quality and impactful. In fact, nearly all respondents from both the booth exit interviews and end of session surveys indicated that they highly likely or likely to recommend IRIS's resources to colleagues. Below the evaluation results are compared to the performance metrics set by IRIS staff ahead of the meeting. IRIS successfully met two of three performance metrics and both impact metrics suggesting the effort made progress towards increasing both the quantity and quality of seismology education and the visibility and recognition of IRIS.

Performance Metric #1 - Reach at least 8.5% of show attendees through the booth, share-a-thons, and hour-long sessions.

In 2019, IRIS reached 924 attendees or 11.7% of show the total attendance. This not only exceeded the 2019 target, but it also exceeded the previous peak for this metric, which was 7.7% of attendees in 2017. This success was driven by the combination of a booth, which reached 8.3% of show attendees, and a suite of 5 one-hour sessions, which reached 3.4% of attendees. Each of these is also a long-term peak reach independently.

The reason for this success may be complex, and, as discussed below, only some of the variables may be in IRIS's control. For example, little new was added to the booth in terms of give-a-ways or attractions this year, that would explain the increased in its impact. However, one possible explanation for the booth's performance was its position in the convention hall. As illustrated in Figure 7 below, IRIS's corner booth was on one of the two main aisle ways in the convention hall. This positioning may have made the IRIS booth more discoverable. Another likely factor related to booth positioning was IRIS's neighbor, Doubleday books, which as noted above gave away a free book to every teacher who filled out a survey (and one of those books was written by the keynote speaker of the conference). The position of the IRIS booth is only somewhat in the control of IRIS. The annual booth selection process occurs based on a points system that is determined by the organizations past purchasing history and volume with NSTA Thus, those who spend more, get to select their booth first. Previous evaluations have not attended to the positioning of the IRIS booth in relation to performance metrics. Thus, IRIS might begin to monitor the booth placement more carefully and refine its selection strategy about based on the results.

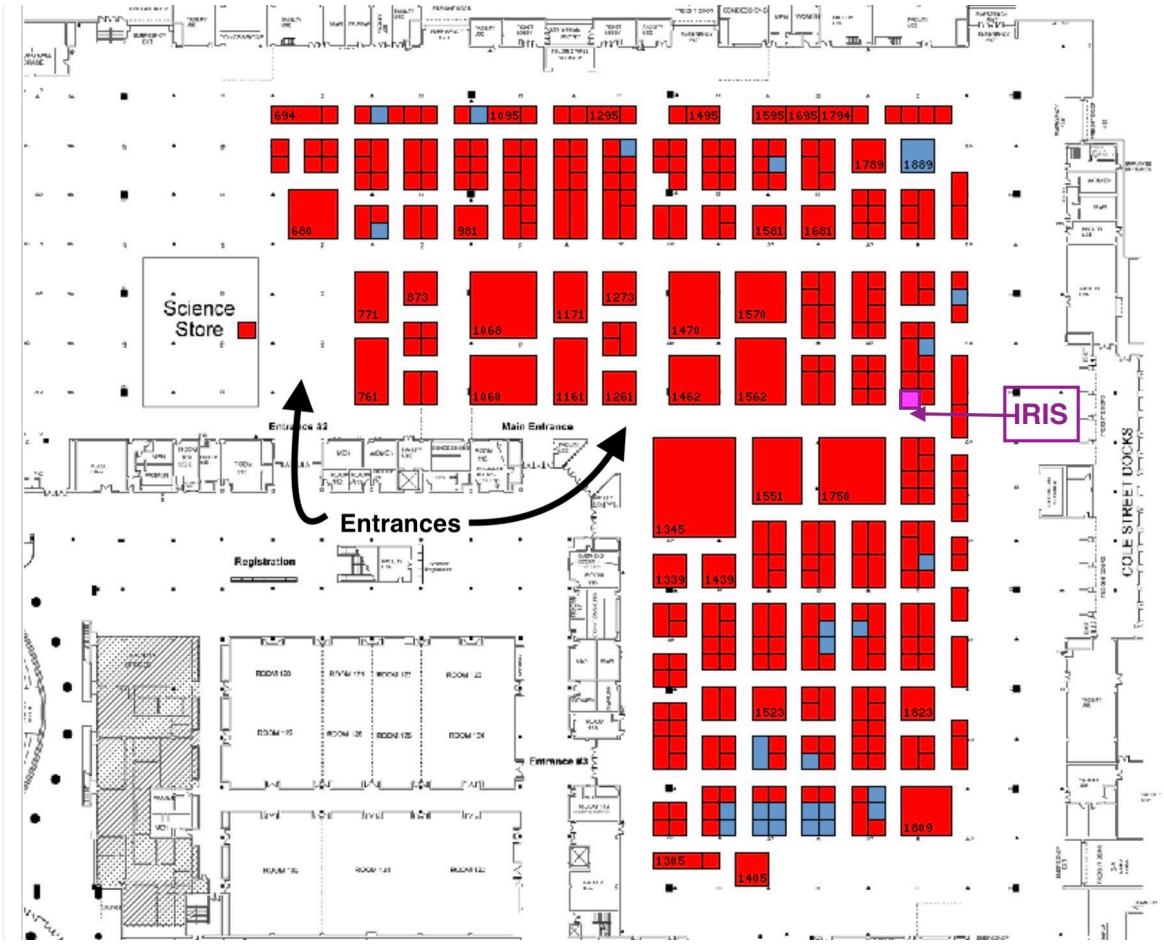

Figure 7: Position of the IRIS Booth (Purple) on the 2019 NSTA exhibit hall floor relative to the main entrances and aisles.

IRIS has a greater ability to influence the performance of one-hour. Here the increased reach may be attributed to two key factors. First, session evaluations over the past several years have helped to identify possible session topics for future IRIS sessions. This information may have helped IRIS craft and propose sessions that are of interest to attendees, which translates into an increased performance. Second, IRIS offered five one-hour sessions in 2019. This is the most sessions IRIS has offered since 2013. IRIS was only able to run this many session by partnering with others such as NESTA, UNAVCO, and Oakland County Public Schools. Such partnerships allow IRIS to get around NSTAs three-session limit for non-profit organizations and fully staff sessions, while also staffing the booth and share-a-thons, with only three IRIS staff attending the show.

Performance Metric #2 – Scan at least 2.9% of the badges of show attendees for the Teachable Moments/IRISEd listserv.

Staff scanned 98 badges or 1.4% of show attendees, this is below the performance metric set ahead of the show, despite having a second scanner available for staff. Current evaluations do not provide information that would explain why there were such a low number of scans this year. However, one possible explanation is that there was a lack of emphasis on scanning at the show compared to talking to as many people as possible. For example, staff only took a scanner to one of the five hour-long session offered by IRIS. Another, likely explanation is that the heavy traffic at the booth combined with the slow

process of scanning (often badges don't easily scan on the iPad scanners) made it difficult to keep up with scanning while still interacting with the many visitors to the booth.

Performance Metric #3 - Optimize programing and costs to keep the cost per interaction at or below $20.

IRIS did meet this performance target with a cost per interaction of $18.33 as described above. Overall costs, at $16,934, were slightly higher in 2019 than the previous two years. However, the reach at the booth and the hour-long sessions spread those dollars over significantly more interactions than had been achieved in previous years. Over the past few years staff have determined that there are few opportunities to reduce overall costs further. Thus, focusing on strategies to continue to increase reach is the best strategy to continue to meet this metric.

Impact Objective #1 – At least 90% of attendees indicated the intention to use the featured IRIS resources in their classroom.

As described above, 93% of respondents across all sessions indicated that it was likely (33.7%) or highly likely (58.9%) that they would use IRIS resources presented in the session in their classroom. Thus, IRIS met or exceeded this impact objective and made progress towards increasing both the quantity and quality of seismology education while at NSTA.

Impact Objective #2 –80% of visitors spending at least 30 second at the booth with staff would be able to recognize the IRIS logo and name or identify at least one IRIS resource the intend to explore/use.

Exit interviews from the booth found that all twenty-one participants were able to identify the IRIS logo and were able to identify at least one resource they intended to explore/use later and were confident (9%) or very confident (91%) in their ability to access the resources from the handout they had receive. Thus, IRIS met or exceeded this impact metric and contributed to enhancing the visibility and recognition of IRIS among teachers while at NSTA.

Recommendation #1 – Discontinue eblast and experiment with other advertising options

As described above, IRIS has used eblasts as one of the primary advertising mechanisms to promote the booth and schedule of sessions and share-a-thons to conference attendees. While the eblasts statistics indicate that about a third are "opened" or loaded in an email client, other evaluations (e.g. the raffle of the Pocket Lab, booth exit interviews, and the end of session evaluations) all suggest that the eblasts have little impact on attendee behavior. For example, only one respondent to all of the end of session surveys indicated that they had received an email announcing the session. Similarly, 4 of the 21 participants in the booth exit interviews reported recognizing the email. However, follow-up questions revealed that most interviewees said they were getting so many emails from NSTA that they stopped reading at them and just deleted them.

Thus, IRIS should schedule to meet with NSTA advertising staff to explore other advertising options instead of the eblasts. For example, end of session surveys found that 94.4% of participants identified the conference program as the primary way that participants learn about IRIS sessions. It is unclear from the evaluation if participants were referring to a physical or online conference program, but a color advertisement in the program could be an effective approach. Another possible advertising approach could be to invest in one or two pop-up banners to put in the hallway outside rooms where IRIS is running session. The banner could be generic but have a designated spot to attach the annual schedule of sessions. Regardless of which new advertising approach(es) are pursued, it will be important to also develop an accompanying evaluation strategy to measure the effectiveness of the new approach.

Recommendation #2 – Develop 2021 session ideas prior to the 2020 NSTA meeting and include in end of session evaluation

The end of session evaluations provided useful data about both how participants select the session they attend and the topics they would like to see in future IRIS offerings. For example, the most frequent reason for selecting an IRIS session was because the topic sounded interesting. While the current evaluation does ask participants what sessions they would like to see IRIS offer in the future, the item only receives a small number of responses, possibly because participants have to come up with topics themselves. IRIS could make better use of this item if staff developed a list of possible 2021 sessions prior to the 2020 NSTA. The list could then be included in the 2020 end of session evaluation where participants could then rank the proposed sessions according to interest. An option for participants to propose their own ideas could still be included.

Recommendation #3 – Tailor titles and descriptions to align with how participant's selection practices

In addition to interest, evaluations also revealed that participants selected session because of a desire to get resources for their classrooms (24.4%), improve their pedagogical content knowledge (19.5%), and/or content knowledge (16.6%). Given this, the titles and descriptions of sessions should be developed in a way that emphasizes that participants will leave with free, fully developed classroom resources, and that the session itself will provide them with opportunities to improve their understanding of the underpinning science and the reasons the instruction is developed and sequenced as introduced.

Recommendation #4 – Leverage partnerships to maximize the number of hour-long sessions offered, and in turn, reach more attendees.

Annually, NSTA limits the number of sessions any single organization can submit. According to the submission rules, "Nonprofit Organizations and Government Agencies are invited to submit up to a maximum of three (3) proposals for consideration". However, through collaboration with UNAVCO and NESTA, IRIS was able to offer two additional hour-long sessions beyond the three submitted independently. Because of these additional sessions, IRIS reached an estimated 3.4% of conference attendees, which is the largest percentage of attendees reached via hour-long sessions since tracking began 2013. Moving forward, IRIS should actively seek such collaborations to extend the number of sessions it is able to offer at NSTA. Ideally, IRIS would partner to offer five or more sessions annually.

Recommendation #5 – Monitor and assess booth placement.

As noted above, the booth was extremely productive in 2019 reaching 572 attendees or 8.3% of show attendees. This reach is well above the previous peak of 5.9% of attendees. While exciting for the program, current evaluations are not able to help answer why such reach was achieved. As described above, it seems that booth placement may have been a critical factor to this success. Since IRIS is able to control the location of the booth within the confines of the NSTA selection process, IRIS should make efforts to more actively monitor the

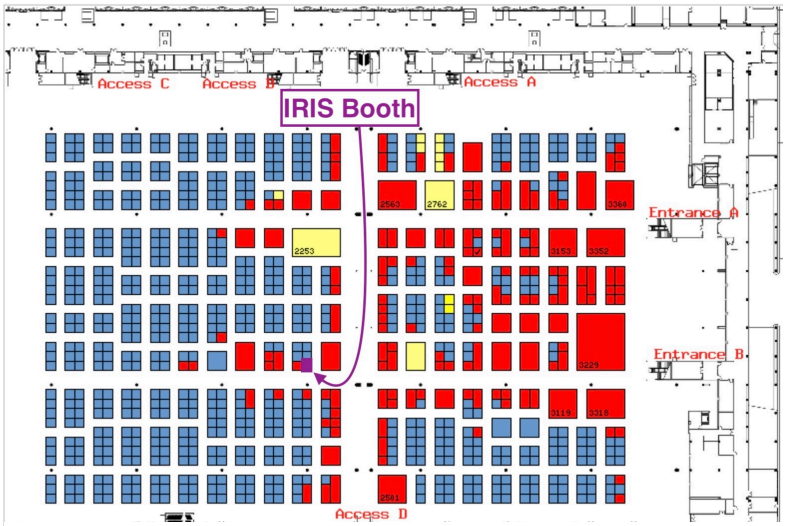

Figure 8: Position of the IRIS Booth (Purple) on the 2020 NSTA exhibit hall floor relative to the main entrances and aisles.

booth location in the future and attempt to tailor strategies for future placement. For example, at the time of this report, the 2020 booth has already been selected (Figure 8). Discussions with staff reveal that a hierarchical selection strategy was employed. First, a corner booth on one of the main aisles was selected. The actually location took into account staff predictions of traffic flow through the floorplan (e.g. where are there entrances and where are busy booths likely to be). Thus, the IRIS booth was positioned on a main aisle, and very close to a secondary cross aisle. This was prioritized above ideas such as being close to some of the larger booths of the larger vendors nearest to the front of the hall. At the same time there was a desire to also avoid being in the back of the hall where some booths may not sell. Because Figure 8 was generated after the time of IRIS's booth selection it is not clear if staff made attempts to be close to or far from other organizations booths. While an evaluation may not be able to easily account for all possible variables. Beginning to explore some the efficacy of some strategies may be helpful to IRIS going forward.

Recommendation #6 – Scan all hour-long session participants at the door and send follow-up surveys
As illustrated above, IRIS failed to meet its performance metric for the percentage of attendees scanned and added to the teachable moment listserv. One way to significantly increase the number of individuals scanned at NSTA is to scan all hour-long session participants as they enter the room. To help them understand what they have registered for, a slide on the screen could explain what the Teachable Moments product is. Not only would this increase the percentage of attendees added to listserv, but it would provide a contact list for follow-up surveys. Follow-up surveys would allow IRIS to better understand how and to what degree the session impacted their teaching practice beyond predictions of how likely they are to use resources. Scanning attendees at the door will require IRIS to continue to have two scanning systems available. It will also require additional onsite coordination to ensure that a second IRIS staff is present at each session to conduct the scanning at the door while the primary presenter prepares for the session.

Recommendation #7 – Explore the development of a self-scanning station option for the booth
As described above, less than 100 attendees were added to the Teachable Moments listserv at NSTA. While evaluations did not shed light on why such a small number of teachers were scanned, several possible explanations were proposed in the discussion of Performance Metric #2. Of note was the challenge of both keeping up with the flow of traffic at the booth while also scanning badges. A possible solution to this would be to explore the development of a self-scanning station for the booth. This could be a device to hold an iPad set up to scan accompanied by signage and instructions to make people aware of what they are signing up for and how to use the scanner. If placed by a monitor, Teachable Moments could be looping so booth visitors could get a sense of the product.

Recommendation #8 – Repeat the 2017 brand recognition survey
The brand recognition survey conducted in 2017 provided IRIS with a useful baseline of information. This survey found that About two thirds of respondents who had taught about earthquakes, seismic waves, Earth's internal structure, and/or plate tectonics within the last three years had not heard of IRIS (n=85). Of the remaining third that had heard of IRIS, 29 reported using IRIS resources. For those educators that had used IRIS resources, they had a very favorable impression of them describing them as "very good" (48%) or "good" (17%) and were likely to recommend them to a colleague. As part of a continuous monitoring effort, this survey should be repeated in 2020 to track changes in responses and collect additional information regard perceptions of products and programs.

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Appendix A: Pre-show Eblast

Shake up NSTA with IRIS!

Our FREE earth science resources include animations, seismic data, classroom activities and demos, videos, earthquake recording software, posters, and much more!

Find us at our **BOOTH #1861**, enter our giveaway (see below), and attend our exciting learning sessions!

Thursday

Bring NASA's Seismic Data from Mars to Your Classroom!
Thursday, April 11 3:30 PM - 4:30 PM
America's Center, Room 242

Friday

Meet Me in the Middle Session: **Middle Level Share-a-Thon**
Friday, April 12 3:00 PM - 4:30 PM
Marriott St. Louis Grand, Majestic D/E

Saturday

Accounting for Uncertainty in Scientific Argumentation
Saturday, April 13 9:30 AM - 10:30 AM
America's Center, Room 152

NESTA, UNAVCO, and IRIS Session: Are Earth's Plates Really Moving? Explore Earth Science Data
Saturday, April 13 9:30 AM - 10:30 AM
America's Center, Annex

National Earth Science Teachers Association (NESTA) Shares:
Earth System Science Share-a-Thon
Saturday, April 13 11:00 AM - 12:00 PM
America's Center, Annex

After an Earthquake: Real-Time Earthquake Data as a Hook to Encourage Answer-Seeking about the Geologic and Societal Context of the Event
Saturday, April 13 2:00 PM - 3:00 PM
America's Center, Room 223

Sunday

NESTA and UNAVCO: Hands-On Demonstrations and Models for Your Earth Structure, Earthquake, and Plate Tectonics Unit
Sunday, April 14 9:30 AM - 10:30 AM
America's Center, Room 225

Stop by our booth and mention this email to enter a drawing to win The PocketLab One - a stand alone 3-axis MEMS accelerometer!

We hope to see you there!

Funding provided by NSF through the SAGE facility operated by the Incorporated Research Institutions for Seismology (IRIS)

CONTACT

Have questions? Contact us at:
epo@iris.edu

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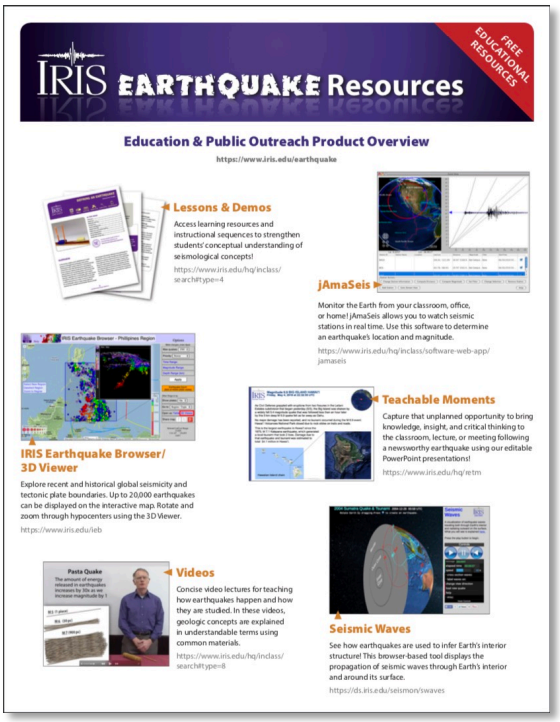
Appendix B: Earthquake Resources Handout



Front

Back

Appendix C: Workshop Attendance Photos

Photo of attendance at IRIS's session "NASA's InSight Mission to Mars" from the back of the room, at the beginning of the session.

Photo of attendance at the IRIS/UNAVCO session "Are Earth's Plates Really Moving" from the side of the room, near the end of the session.

Photo of attendance at IRIS's session "Accounting for Uncertainty in Scientific Argumentation" from the right back corner of the room, at the beginning of the session.

Photo of attendance at the IRIS/UNAVCO session “Models for Your Earth Structure, Earthquake, and Plate Tectonics Unit” from the right rear side of the room, near the beginning of the session.

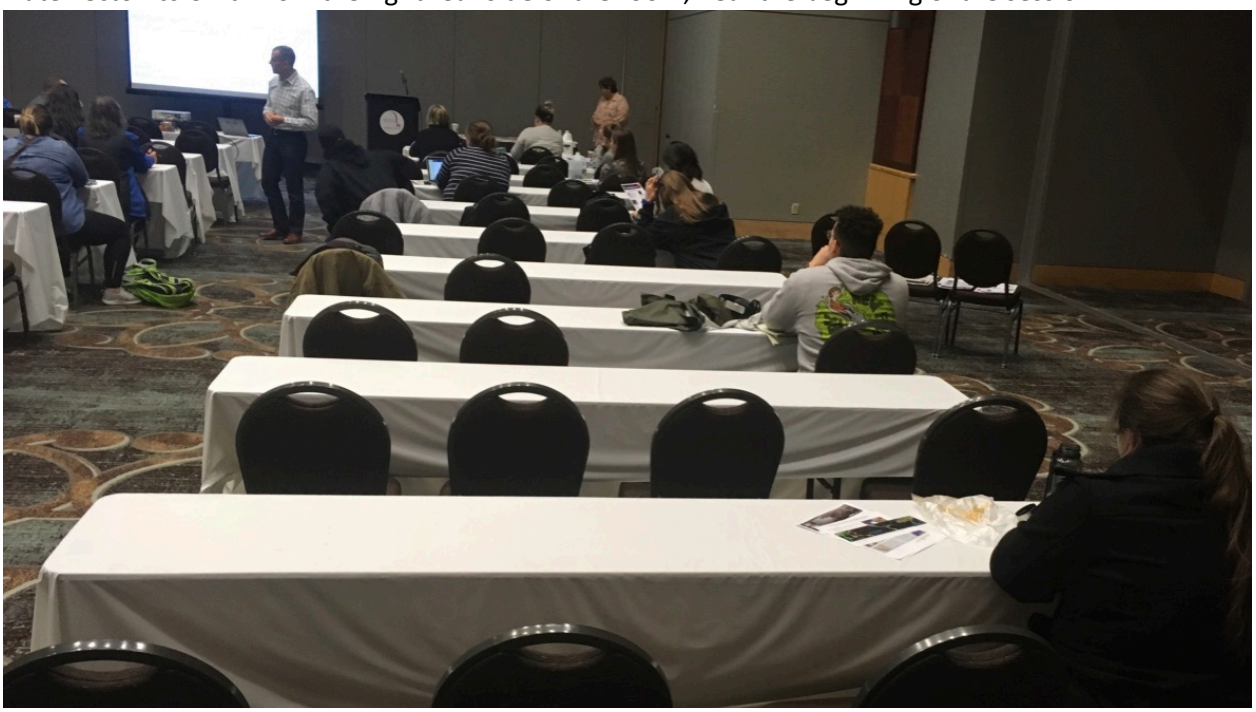


Photo of attendance at the IRIS/UNAVCO session “Models for Your Earth Structure, Earthquake, and Plate Tectonics Unit” from the left rear side of the room, near the beginning of the session.

Appendix D: Accounting for Uncertainty in Scientific Argumentation

*Note: Due to a formatting error with evaluation for this session, some items were omitted.

Table 1: Ways participants first heard about the session and its frequency. Participants selected ONLY one statement or "Other" and describe.

Statement	Frequency
Found it in the Conference Program	19
Received an email announcing it	0
Saw it on Social Media	0
Visiting the IRIS Booth	0
Word of Mouth	0
Other (Please describe) • Know one of the presenters (Mike) • Know Mike G	2

Table 2: Reasons participants attended this session and the frequency they were selected. Participants could select more than one statement or select "Other" and describe.

Statement	Frequency
Topic Sounded Interesting	15
Wanted to get resources for my classroom	5
I am familiar with IRIS and its products/resources	1
I have heard the presenters in the past	1
Wanted to improve my science content knowledge	3
Wanted to improve my pedagogical content knowledge (how best to teach these science topics)	16
Other (Please describe)	0

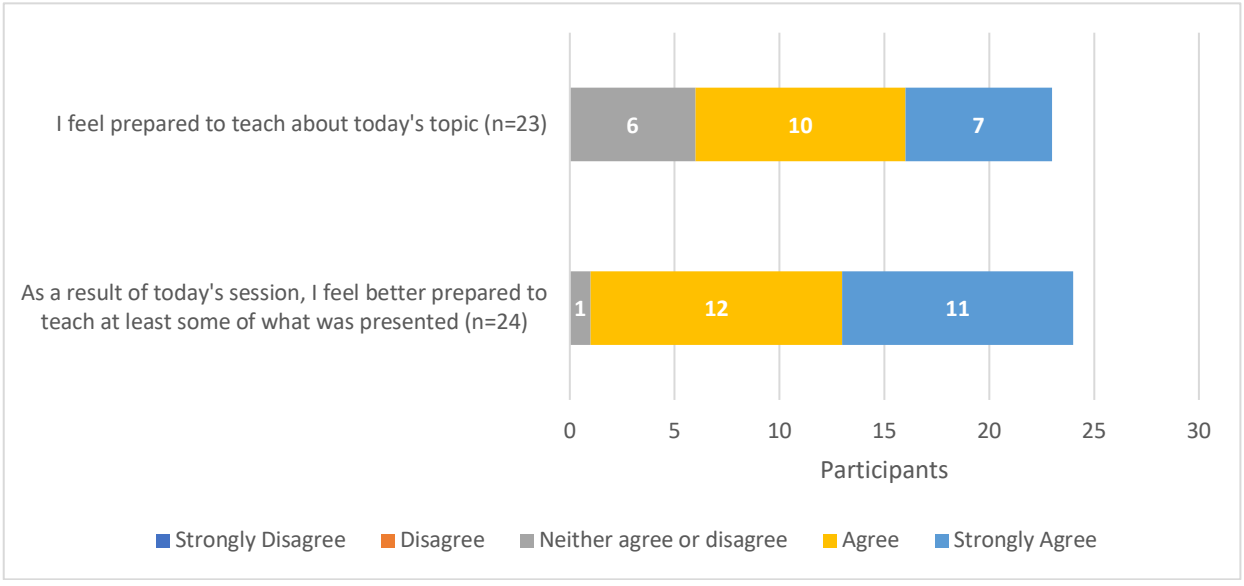


Figure 1: Participants' perceptions of IRIS's Accounting for Uncertainty session at the 2019 NSTA national conference.

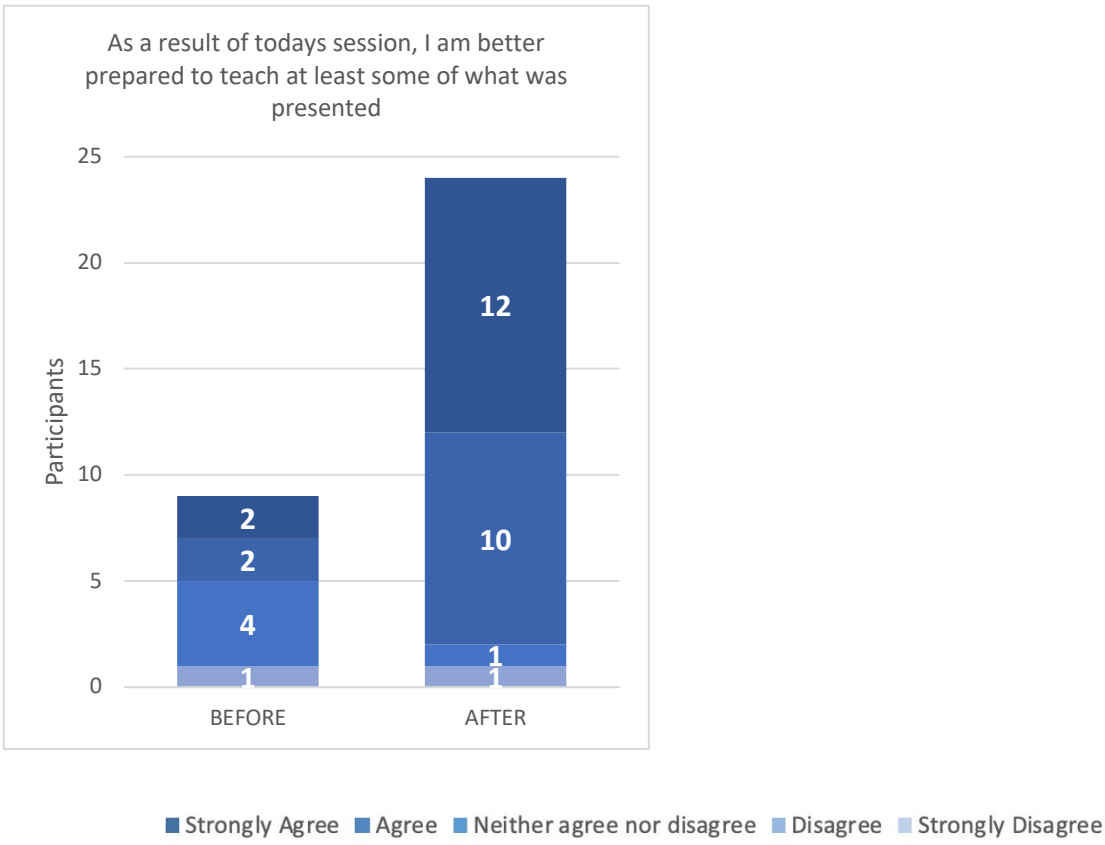


Figure 2: Participants' degree of agreement about their preparedness to teach the content presented as measured both before (measured retrospectively) and after the session. Due to an error in printing, a number of similar items were not scored by participants, and as illustrated above, many participants only provided an "After" score.

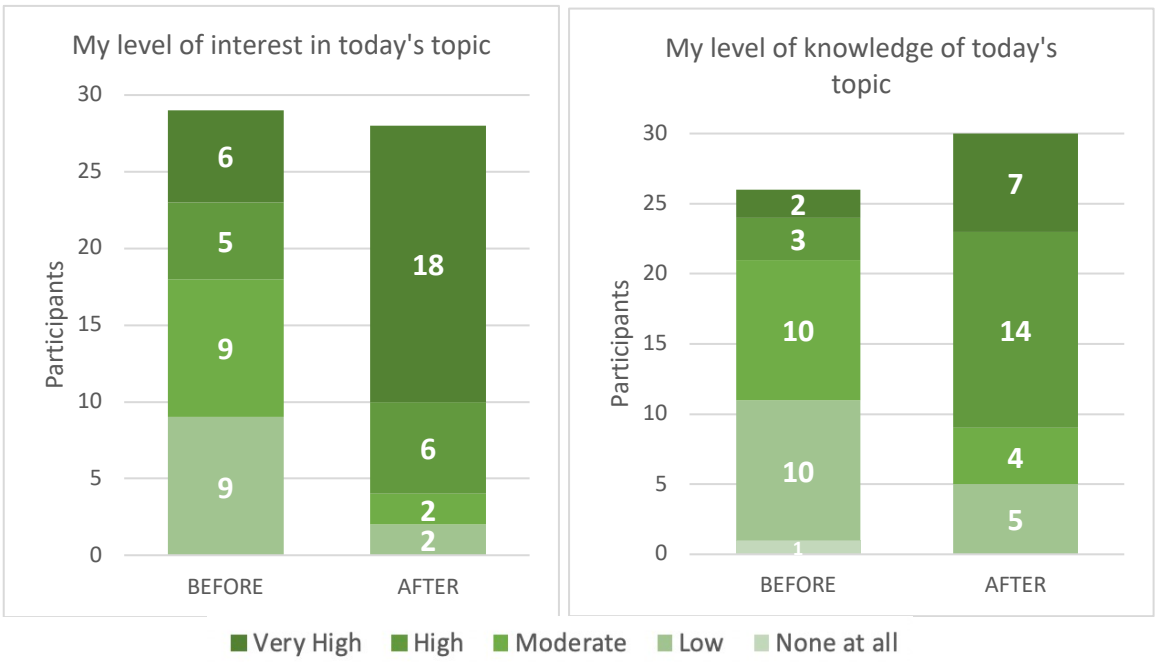


Figure 3: Participants' degree of interest in and knowledge of the topics included in the Accounting for Uncertainty session as measured both before (measured retrospectively) and after the session.

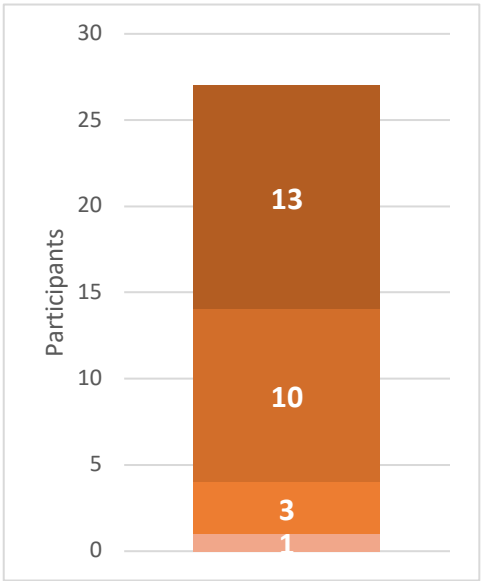


Figure 4: Perceived likelihood that participants will use the IRIS resources from today's session in their classroom.

Table 3: Topics participants would like to see IRIS offer at future NSTA conferences and the frequency they were proposed

Topic	Frequency
APBS - Specific	1
I'm impartial - Not really a fan of Earth Science	1
Recent EQ increase or Oklahoma/Kansas	1
Middle school NGSS lessons	1
The data analysis exercise that end was very nice! More like that! Also - bead activity is something I'll keep	1
Costal Erosion	1

Table 4: Suggestions for improving the Accounting for Uncertainty session and their frequency they were proposed

Improvement(s)	Frequency
It was great!, Well done! Robust conversations, 2 great guys! No improving needed	4
Provide examples of student work. Provide template lessons online or powerpoints using flag model	2
A longer format would be nice, More time	2
Examples of data sets for other disciplines	1
Emphasize human element of bold your willing to be w/uncertain claim	1
Stamping the keg takeaway	1
Just not something I see myself using in the elementary world	1
Need more resources for critiquing claims	1

Table 5: Participant's responses "Is there anything else you would like to share?"

This session was truly exceptional
Good speaker interaction - Very interesting
Fantastic! Thank you for doing it!

This was the session where time seemed to elapse the fastest. It was highly engaging and very informative
Interesting ways of presenting this with examples and discussion

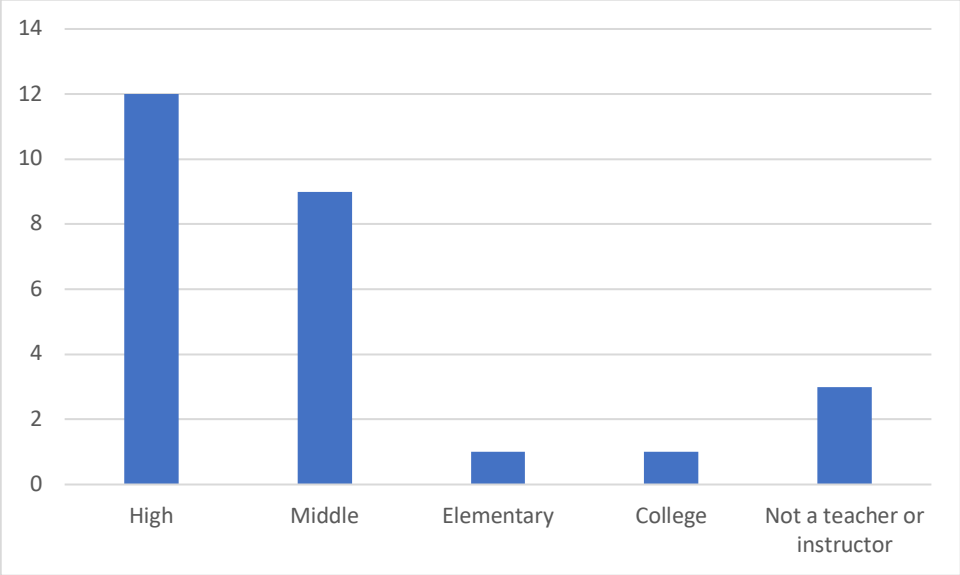


Figure 4: Distribution of participants' teaching situation

Table 6: Maximum, minimum, and average teaching experience of workshop participants

Max	33
Min	1
Average	13.2

External NSTA Evaluation

Please indicate the degree to which you agree with the followings statements.	**Average score (scale = 1 to 5, where 1=strongly agree)**	**(n)**
I selected this session for immediate classroom use.	NA	0
I selected this session based on the reputation of the speaker.	NA	0
I selected this session to improve my personal pedagogical knowledge/skill.	NA	0
I selected this session to improve my science content knowledge.	NA	0
The session met my needs.	NA	0
The information presented was clear and well-organized.	NA	0
Safe practices were employed.	NA	0
The session avoided commercial solicitation.	NA	0
The session should be repeated at another NSTA conference.	NA	0

Appendix E: Are Earth's Plates Really Moving? Explore Earth Science Data

Table 1: Ways participants first heard about the session and its frequency. Participants selected ONLY one statement or "Other" and describe.

Statement	Frequency
Found it in the Conference Program	10
Received an email announcing it	0
Saw it on Social Media	0
Visiting the IRIS Booth	0
Word of Mouth	0
Other (Please describe)	0

Table 2: Reasons participants attended this session and the frequency they were selected. Participants could select more than one statement or select "Other" and describe.

Statement	Frequency
Topic Sounded Interesting	5
Wanted to get resources for my classroom	8
I am familiar with IRIS and its products/resources	5
I have heard the presenters in the past	1
Wanted to improve my science content knowledge	5
Wanted to improve my pedagogical content knowledge (how best to teach these science topics)	6
Other (Please describe) • Love Earth Science	1

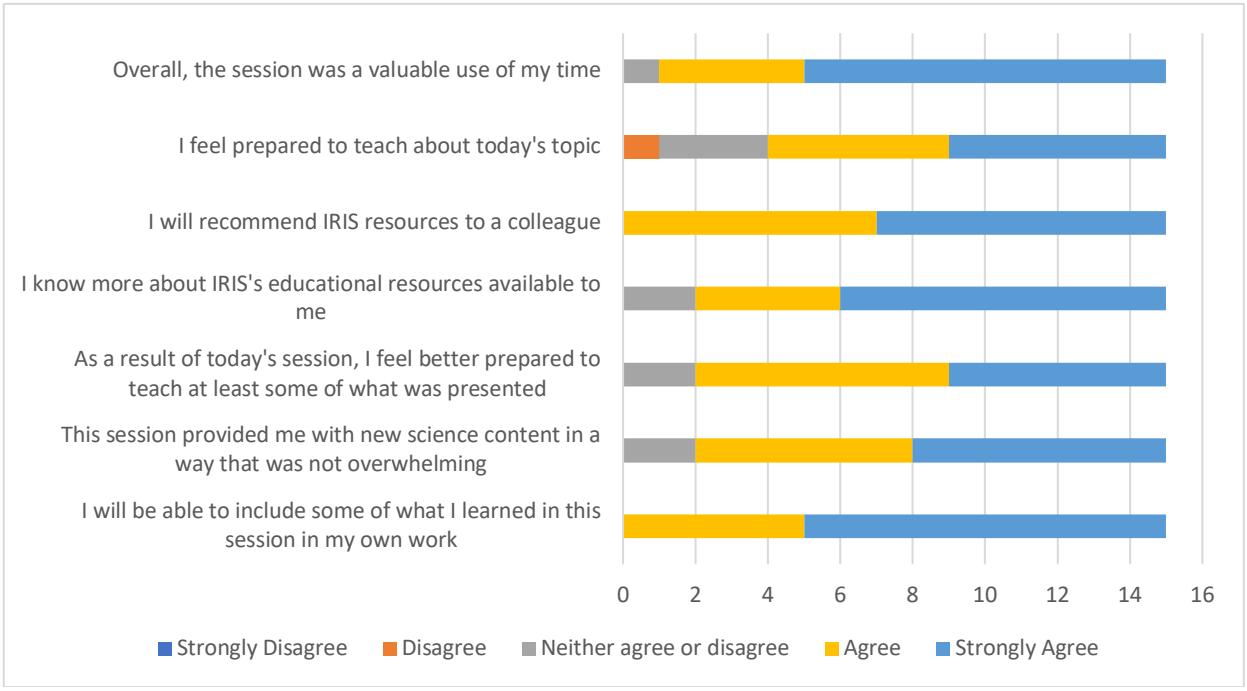


Figure 1: Participants' perceptions of the Are Earth's Plates Really Moving session at the 2019 NSTA national conference).

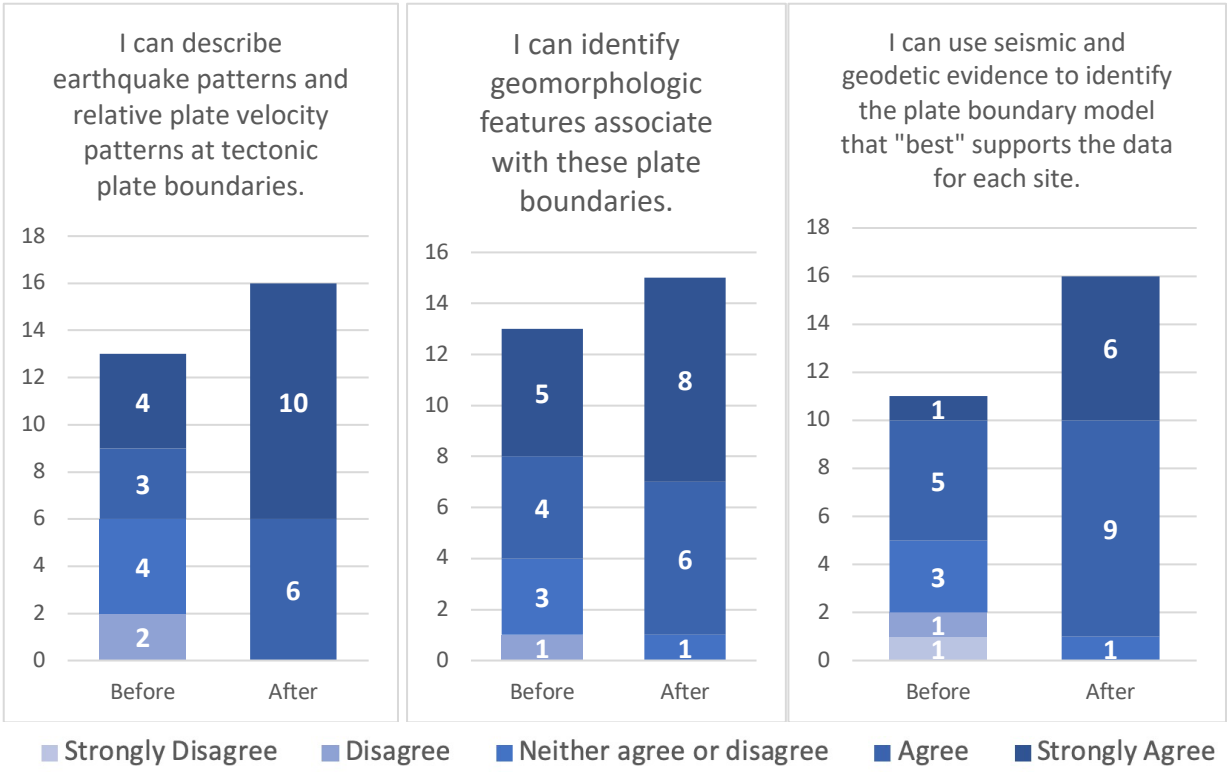


Figure 2: Participants' degree of agreement two statements regarding the Are Earth's Plates Really Moving session as measured both before (measured retrospectively) and after the session. Formatting of this item on the survey resulted in some participants only completing the "after" aspect.

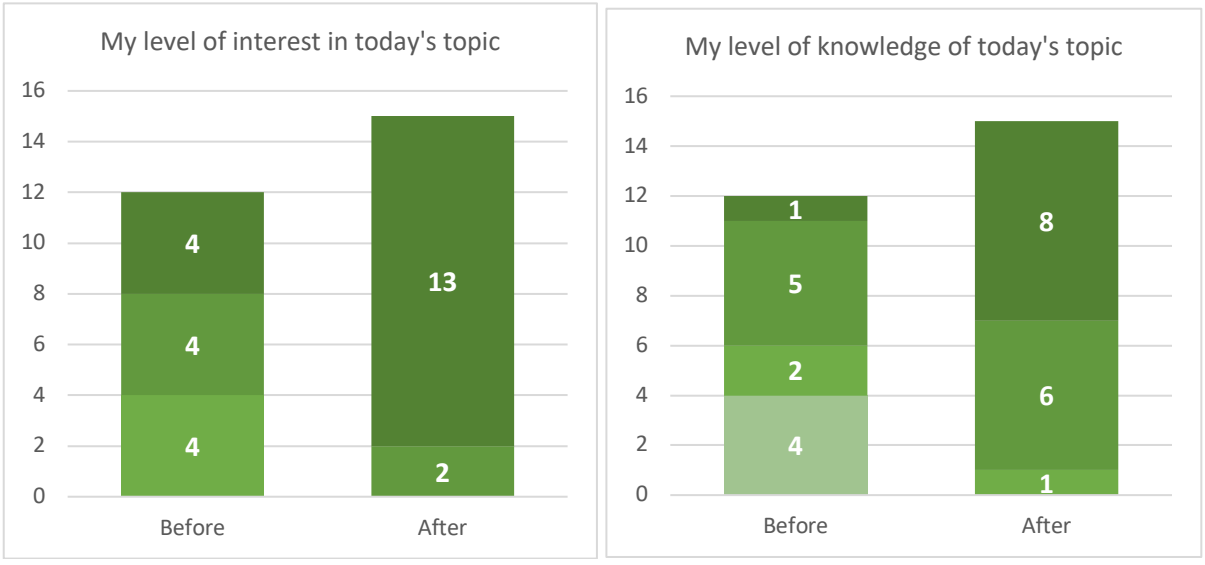


Figure 3: Participants' session as measured both before (measured retrospectively) and after the session. Formatting of this item on the survey resulted in some participants only completing the "after" aspect.

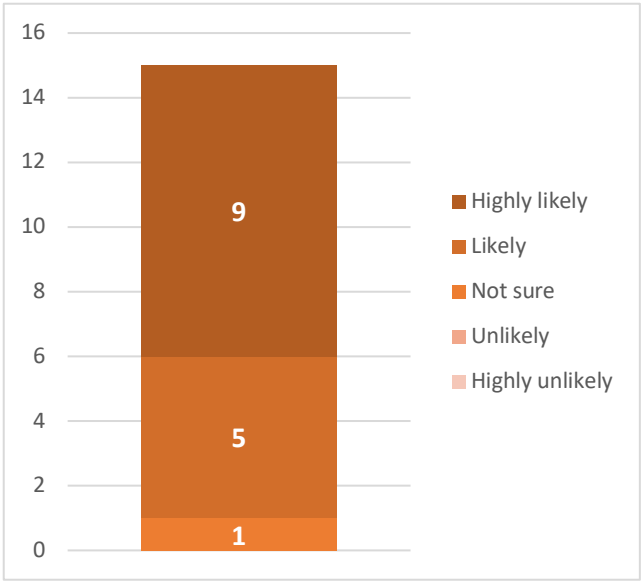


Figure 4: Perceived likelihood that participants will use the IRIS resources from the Are Earth's Plates Really Moving session in their classroom.

Table 3: Topics participants would like to see IRIS offer at future NSTA conferences and the frequency they were proposed

Topic	Frequency
How depth is related to intensity and Human Hazards	2
Volcanoes	1
Perhaps ocean floor features	1
Induced Seismicity	1
Application of Earth systems understanding in alternative energy choices	1
Workshop on Wed to cover as a PD for new teachers or old	1
Geopolitical impacts/cross-curricular impacts	1

Table 4: Suggestions for improving the After the Earthquake session and the frequency they were proposed

Improvement(s)	Frequency
Longer timeslot	3
It was great. The GPS was new to me and I would like to see more.	1
Loved having the 4 sites to investigate!	1
Perhaps have people fill out data tables	1
Video or animation of what arrows are!	1

Table 5: Participant's responses "Is there anything else you would like to share?"

I was reminded of the bigger picture. Understanding how big the effects of plate collisions are.
Thank you
All Great

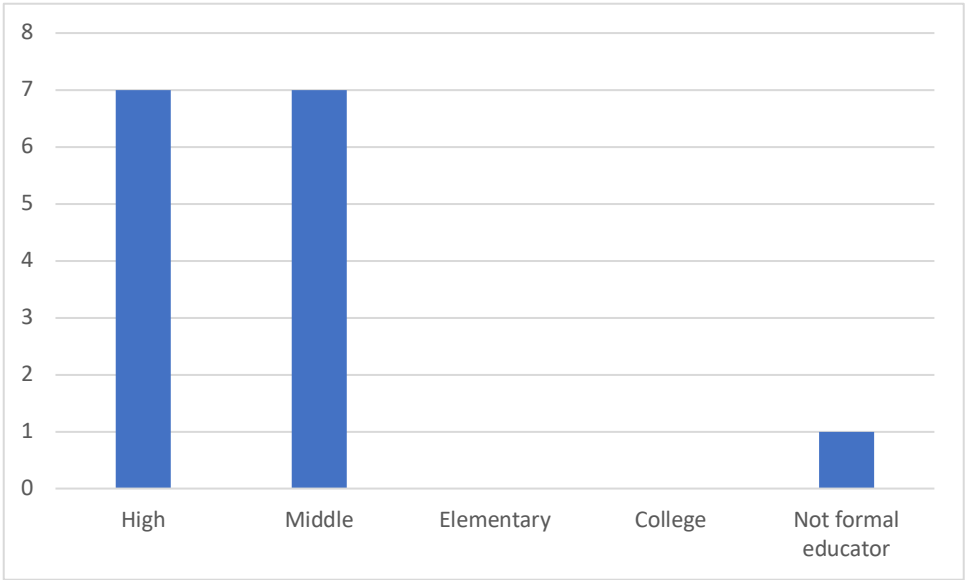


Figure 4: Distribution of participants' teaching situation

Table 6: Maximum, minimum, and average teaching experience of workshop participants

Max	28
Min	2
Average	16.8

External NSTA Evaluation

Please indicate the degree to which you agree with the followings statements.	**Average score (scale = 1 to 5, where 1=strongly agree)**	**(n)**
I selected this session for immediate classroom use.	NA	0
I selected this session based on the reputation of the speaker.	NA	0
I selected this session to improve my personal pedagogical knowledge/skill.	NA	0
I selected this session to improve my science content knowledge.	NA	0
The session met my needs.	NA	0
The information presented was clear and well-organized.	NA	0
Safe practices were employed.	NA	0
The session avoided commercial solicitation.	NA	0
The session should be repeated at another NSTA conference.	NA	0

Appendix F: After an Earthquake: Real-Time Earthquake Data as a Hook to Encourage Answer-Seeking about the Geologic and Societal Context of the Event

Table 1: Ways participants first heard about the session and its frequency. Participants selected ONLY one statement or "Other" and describe.

Statement	Frequency
Found it in the Conference Program	21
Received an email announcing it	0
Saw it on Social Media	0
Visiting the IRIS Booth	0
Word of Mouth	0
Other (Please describe)	0

Table 2: Reasons participants attended this session and the frequency they were selected. Participants could select more than one statement or select "Other" and describe.

Statement	Frequency
Topic Sounded Interesting	13
Wanted to get resources for my classroom	18
I am familiar with IRIS and its products/resources	4
I have heard the presenters in the past	0
Wanted to improve my science content knowledge	8
Wanted to improve my pedagogical content knowledge (how best to teach these science topics)	9
Other (Please describe) • I have a Raspberry Shake and wanted more knowledge on the data • Wanted to see if there was enough from IRIS to use earthquakes to teach most of plate tectonics • Phenomena connection with Physics	3

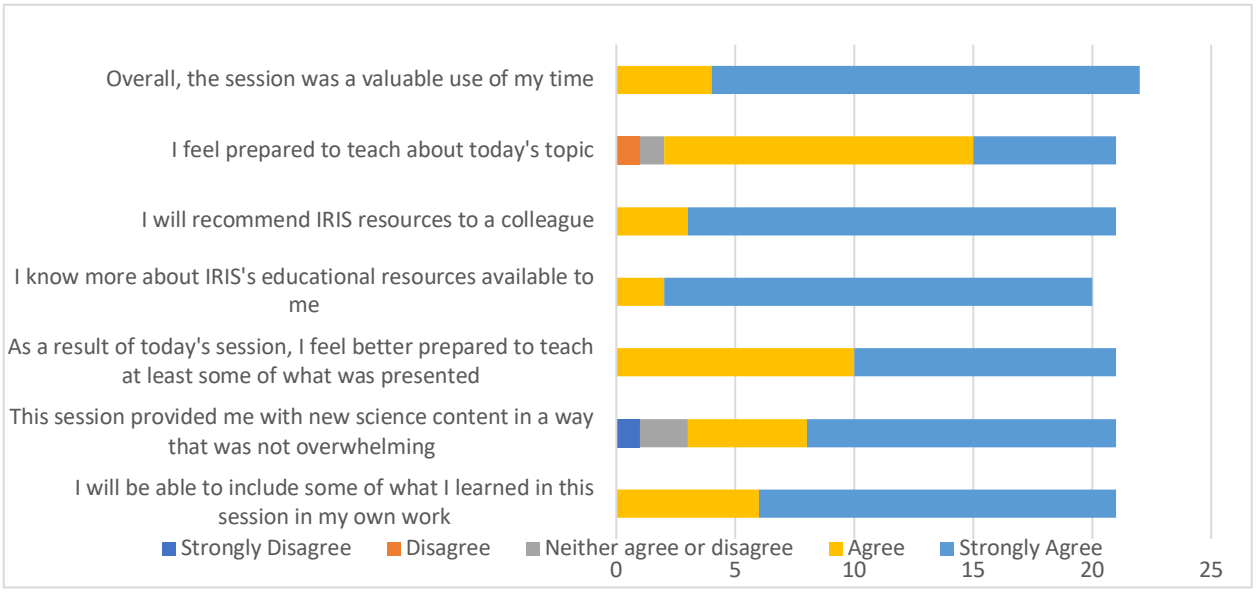


Figure 1: Participants' perceptions of IRIS's After the Earthquake session at the 2019 NSTA national conference.

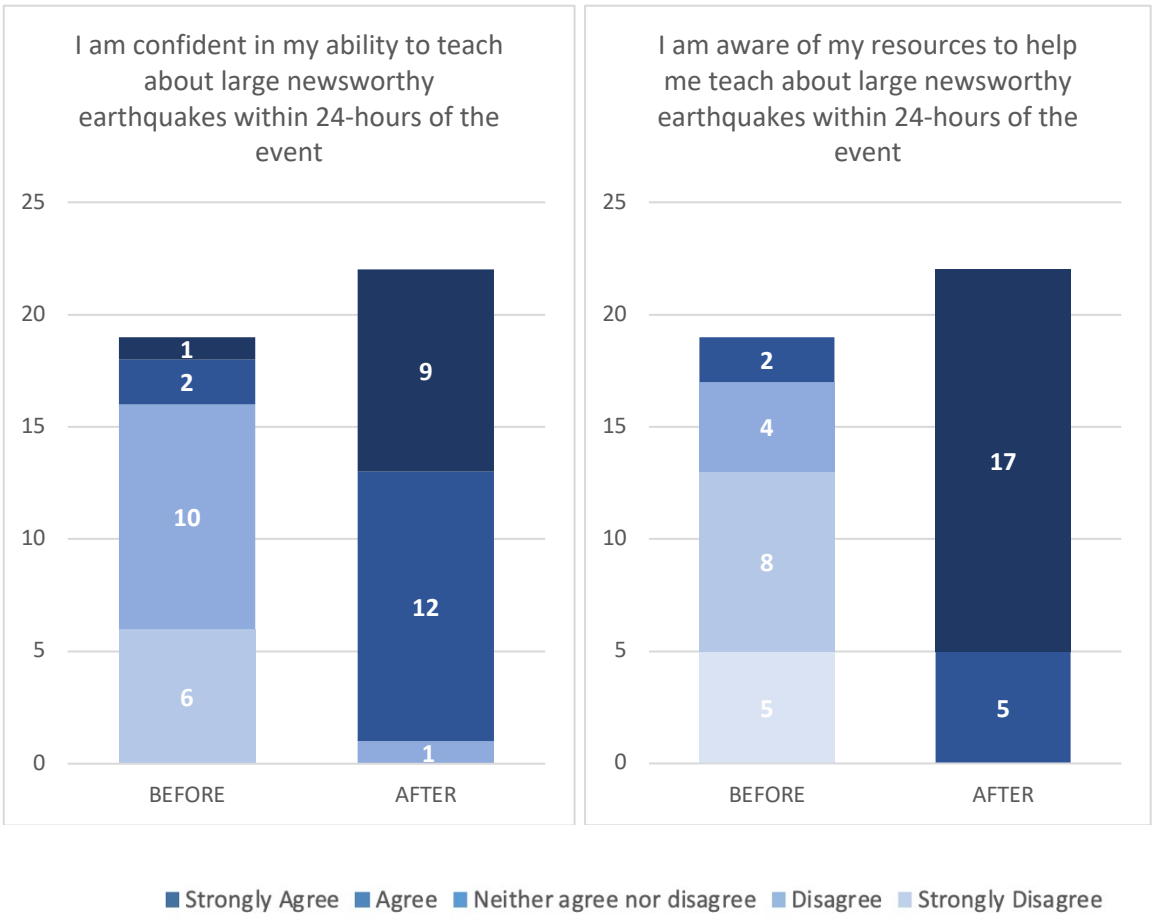


Figure 2: Participants' degree of agreement two statements regarding the After the EQ session as measured both before (measured retrospectively) and after the session.

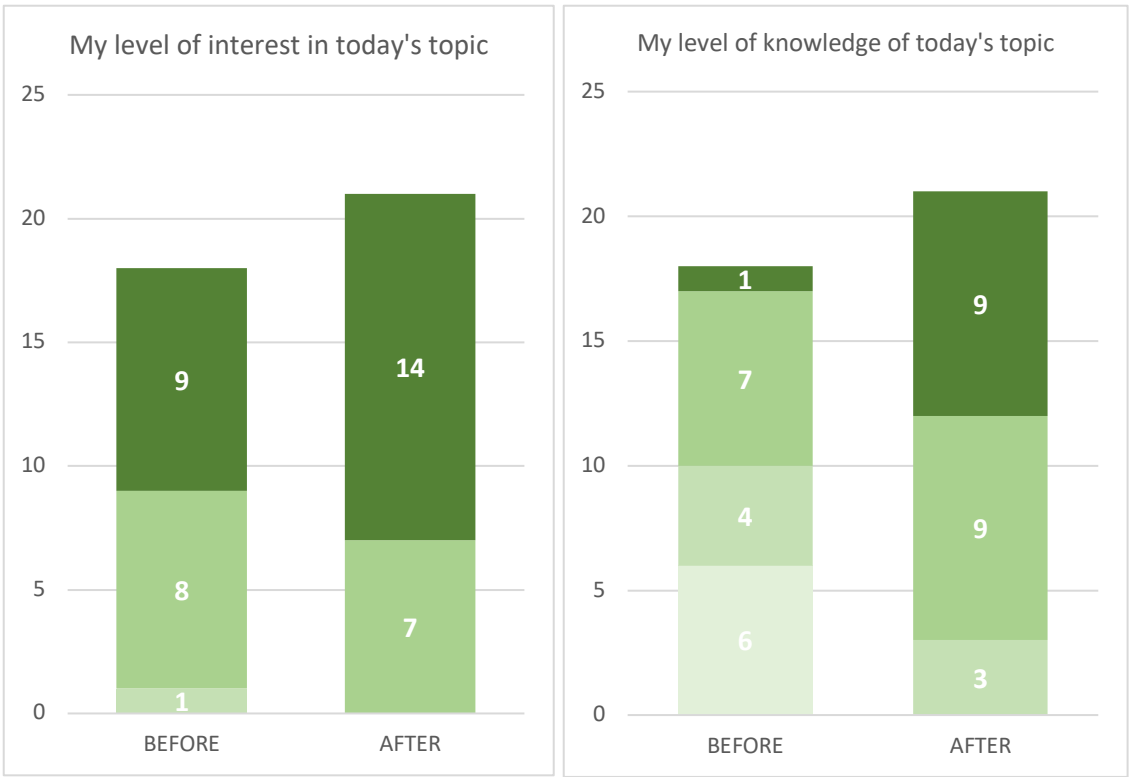


Figure 3: Participants' EQ session as measured both before (measured retrospectively) and after the session.

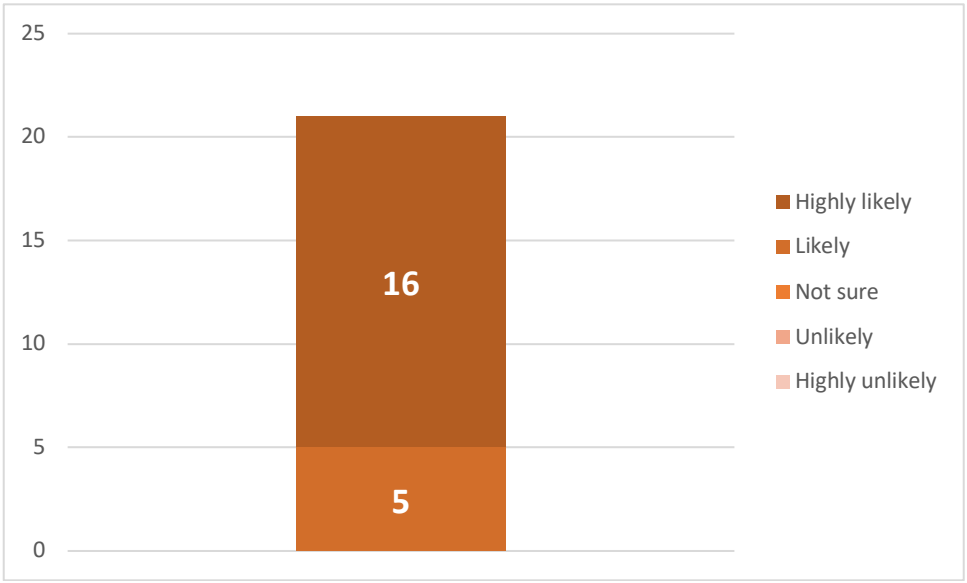


Figure 4: Perceived likelihood that participants will use the IRIS resources from the After the Earthquake session in their classroom.

Table 3: Topics participants would like to see IRIS offer at future NSTA conferences and the frequency they were proposed

Topic	Frequency
Seismic engineering of buildings and hazards	4

Volcanoes	3
Plate tectonics	3
In depth look at seismic data - how is it read and what does it mean? Raspberry shake demos	2
Earth structure	1
Ancient faults and interplate seismic activity	1
Maybe a bit more historical lesson help	1
Completed Lessons	1

Table 4: Suggestions for improving the After the Earthquake session and their frequency they were proposed

Improvement(s)	Frequency
Great Job!, You all were great!	4
None	2
This was great! Would love to see this expanded to a workshop where we go through the steps as if we were the students.	1
Great introduction to your resources	1

Table 5: Participant's responses "Is there anything else you would like to share?"

I think this was amazing and I can't believe I didn't know it existed
Thank you for sharing info

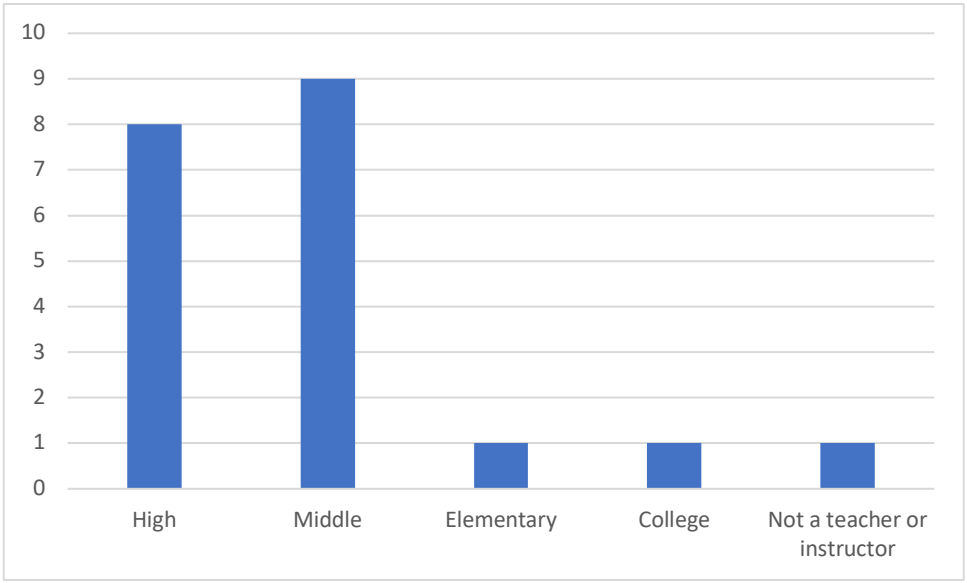


Figure 4: Distribution of participants' teaching situation

Table 6: Maximum, minimum, and average teaching experience of workshop participants

Max	26
Min	2
Average	10.3

External NSTA Evaluation

Please indicate the degree to which you agree with the followings statements.	Average score (scale = 1 to 5, where 1=strongly agree)	(n)
I selected this session for immediate classroom use.	NA	0
I selected this session based on the reputation of the speaker.	NA	0
I selected this session to improve my personal pedagogical knowledge/skill.	NA	0
I selected this session to improve my science content knowledge.	NA	0
The session met my needs.	NA	0
The information presented was clear and well-organized.	NA	0
Safe practices were employed.	NA	0
The session avoided commercial solicitation.	NA	0
The session should be repeated at another NSTA conference.	NA	0

Appendix G: Models for Your Earth Structure, Earthquake and Plate Tectonics Unit

Table 1: Ways participants first heard about the session and its frequency. Participants selected ONLY one statement or "Other" and describe.

Statement	Frequency
Found it in the Conference Program	18
Received an email announcing it	0
Saw it on Social Media	1
Visiting the IRIS Booth	0
Word of Mouth	0
Other (Please describe) - "NESTA"	1

Table 2: Reasons participants attended this session and the frequency they were selected. Participants could select more than one statement or select "Other" and describe.

Statement	Frequency
Topic Sounded Interesting	14
Wanted to get resources for my classroom	15
I am familiar with IRIS and its products/resources	3
I have heard the presenters in the past	4
Wanted to improve my science content knowledge	13
Wanted to improve my pedagogical content knowledge (how best to teach these science topics)	10
Other (Please describe)	0

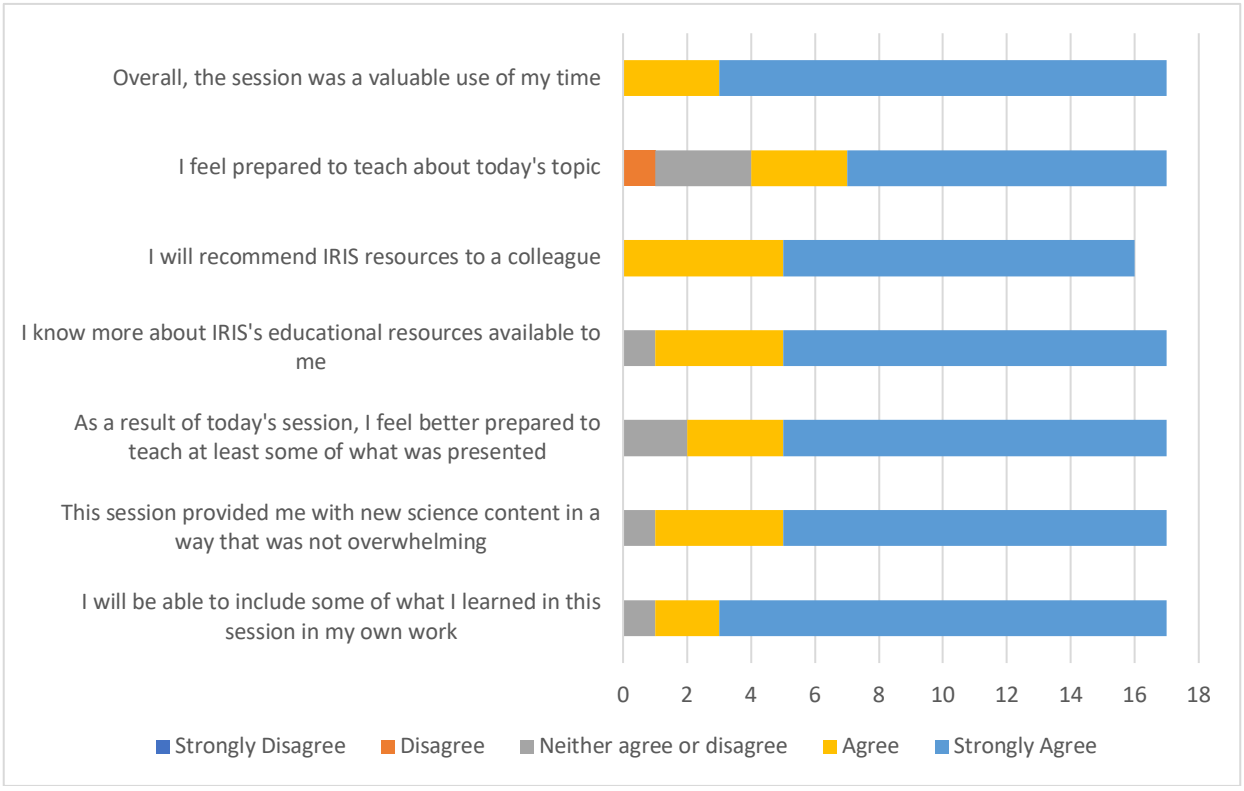


Figure 1: Participants' perceptions of the Models for Your Earth Structure, Earthquake and Plate Tectonics Unit session at the 2019 NSTA national conference.

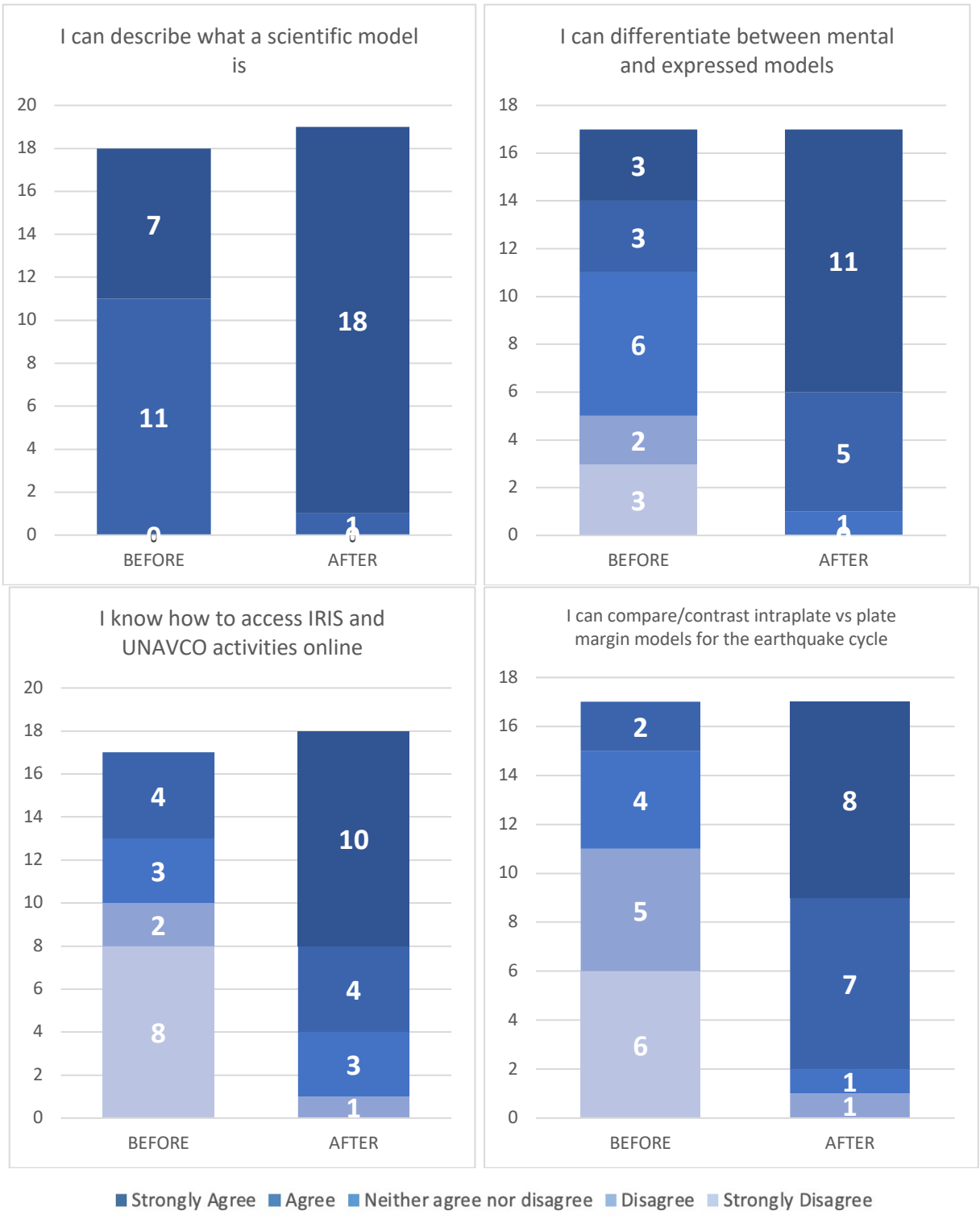


Figure 2: Participants' degree of agreement two statements regarding the Models for Your Earth Structure, Earthquake and Plate Tectonics Unit session as measured both before (retrospectively) and after the session.

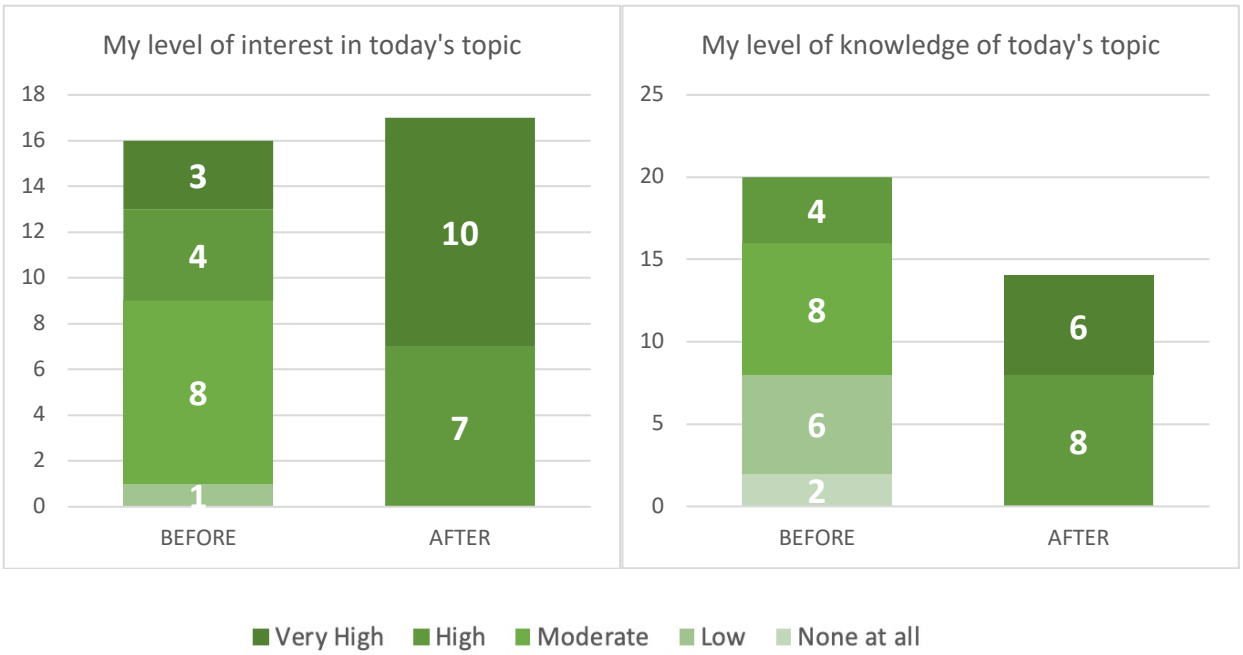


Figure 3: Participants' degree of interest in and knowledge of the topics included in the Models for Your Earth Structure, Earthquake and Plate Tectonics Unit session as measured both before (retrospectively) and after the session.)

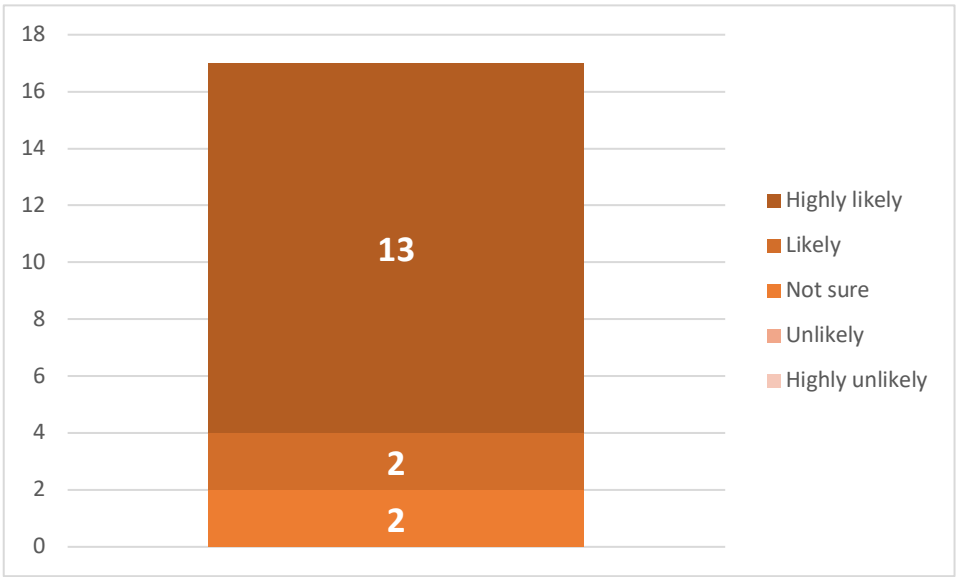


Figure 4: Perceived likelihood that participants will use the IRIS resources from the Models for Your Earth Structure, Earthquake and Plate Tectonics Unit session in their classroom.

Table 3: Topics participants would like to see IRIS offer at future NSTA conferences and the frequency they were proposed

Topic	Frequency
Connect earthquakes to volcanic activity	1
Modeling other types of plate boundaries	1
More videos or hands on	1
Relationship between plate movement and strength of earthquake (as well as overview of different tectonic plates across the world)	1
Not sure	1
Earthquake proof structures	1
Tsunamis	1
How we know internal structure of Earth. Anything about Earth's magnetic field/wandering pole	1

Table 4: Suggestions for improving the Seismic Data from Mars session and their frequency they were proposed.

Improvement(s)	Frequency
Inviting the audience to the front to participate/hands-on	3
Use portable microphone – Hard to hear female presenter	1
Some of the maps were confusing and need more explanation. Include how oil production in OK might effect New Madrid	1
Loved the story and real world connection	1
Film it and put video on website	1

Table 5: Participant's responses to "Is there anything else you would like to share?" and their frequency.

Share	Frequency
Good job!/Great presentation	2
I don't currently teach Earth Science so I am not sure I can use right away	1
Very engaging and cool stuff used to explain concepts. Very helpful to a 1 year teacher who just found out I have to teach this stuff next year!	1
Thank you! I loved the storyline aspect to it and am defnitely using this	1

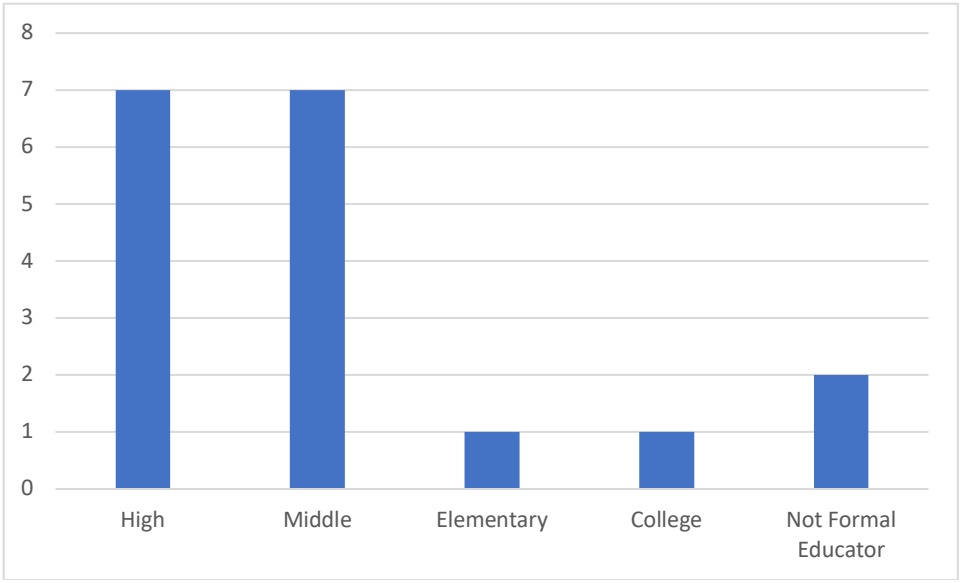


Figure 4: Distribution of participants' teaching situation

Table 6: Maximum, minimum, and average teaching experience of workshop participants

Max	20
Min	1
Average	8

External NSTA Evaluation

Please indicate the degree to which you agree with the followings statements.	**Average score (scale = 1 to 5, where 1=strongly agree)**	**(n)**
I selected this session for immediate classroom use.	NA	0
I selected this session based on the reputation of the speaker.	NA	0
I selected this session to improve my personal pedagogical knowledge/skill.	NA	0
I selected this session to improve my science content knowledge.	NA	0
The session met my needs.	NA	0
The information presented was clear and well-organized.	NA	0
Safe practices were employed.	NA	0
The session avoided commercial solicitation.	NA	0
The session should be repeated at another NSTA conference.	NA	0

Appendix H: Bring NASA's Seismic Data from Mars to our Classroom!

Table 1: Reasons participants attended this session and the frequency they were selected. Participants could select more than one statement or select "Other" and describe.

Statement	Frequency
Topic Sounded Interesting	27
Wanted to get resources for my classroom	18
I am familiar with IRIS and its products/resources	6
I have heard the presenters in the past	1
Wanted to improve my science content knowledge	14
Wanted to improve my pedagogical content knowledge (how best to teach these science topics)	10
Other (Please describe)	0

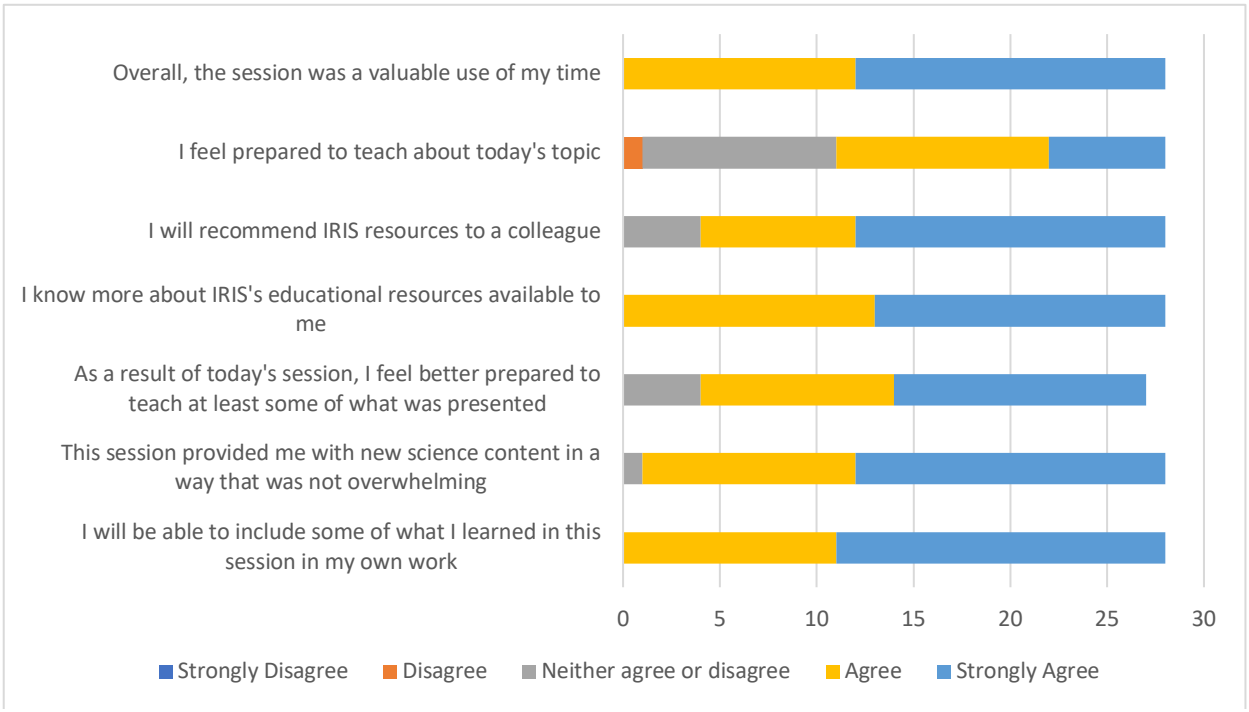


Figure 1: Participants' perceptions of the Seismic Data from Mars session at the 2019 NSTA national conference. s

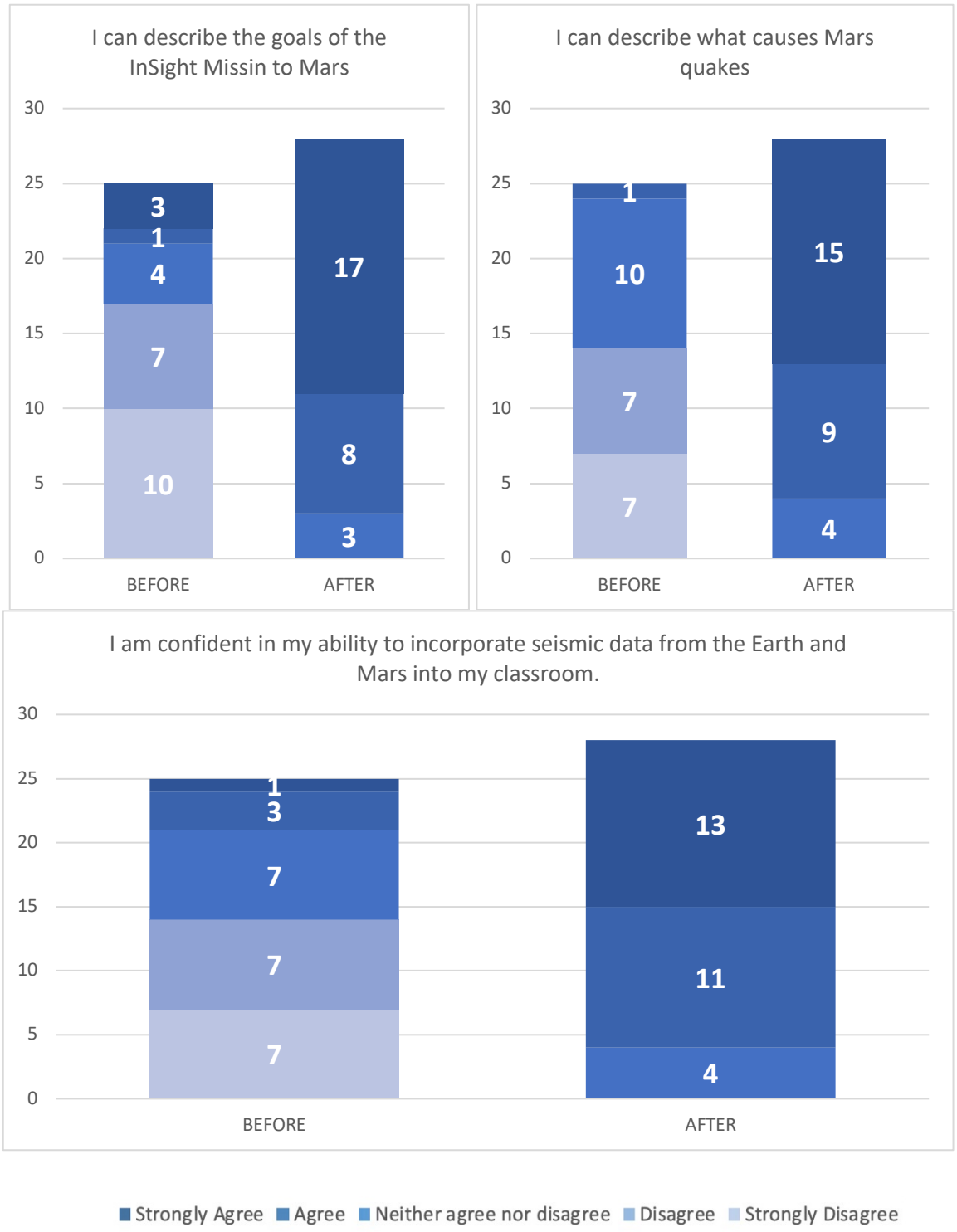


Figure 2: Participants' degree of agreement two statements regarding the Seismic Data from Mars session as measured both before (measured retrospectively) and after the session.

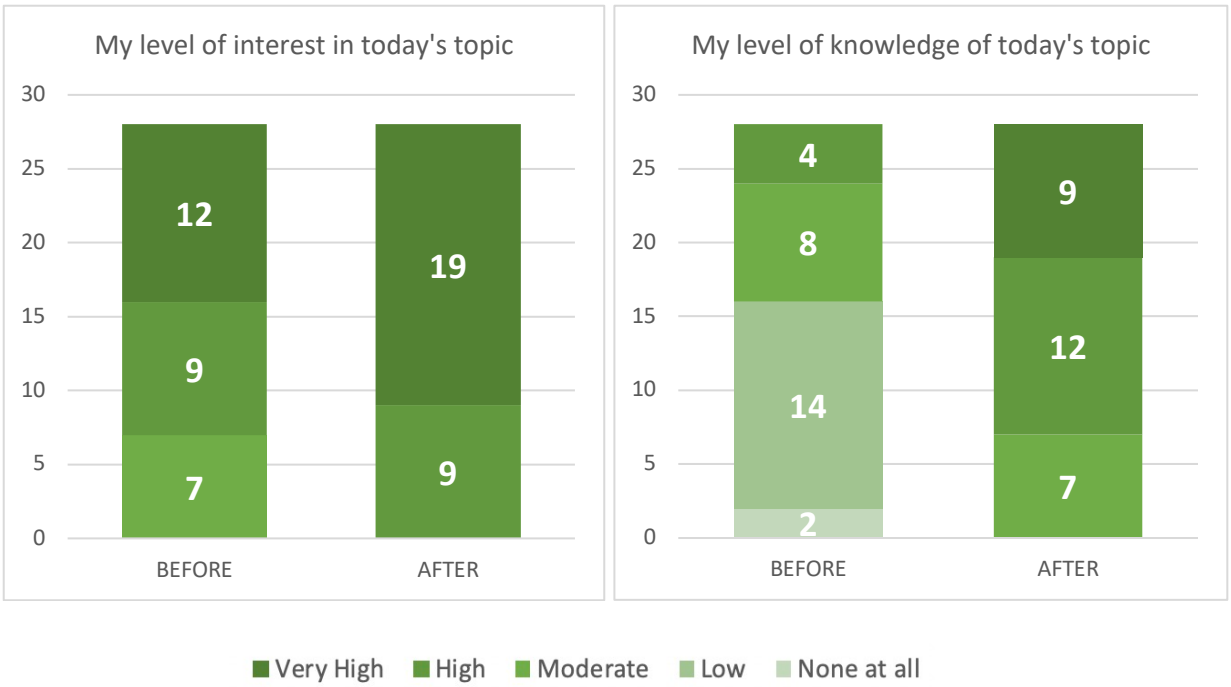


Figure 3: Participants' degree of interest in and knowledge of the topics included in the Seismic Data from Mars session as measured both before (measured retrospectively) and after the session.)

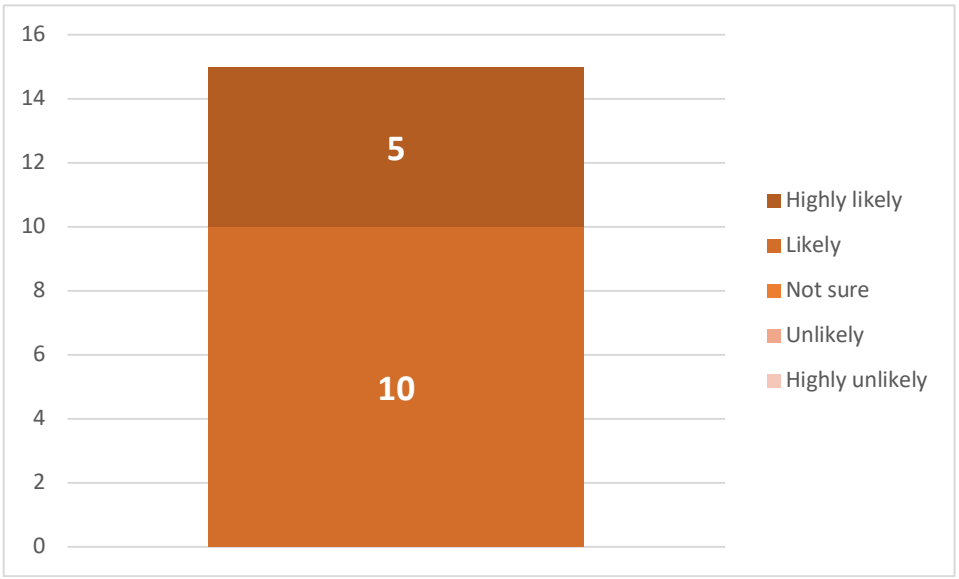


Figure 4: Perceived likelihood that participants will use the IRIS resources from the Seismic Data from Mars session in their classroom.

Table 3: Topics participants would like to see IRIS offer at future NSTA conferences and the frequency they were proposed

Topic	Frequency
Plate tectonics, Earthquakes, All of the above :)	2
Unsure	2
Student Interactive app for prek to 3rd grade	1
Any/all possible	1
Not sure	1
More about S/P waves and detailed analysis	1
The evolution of Earth's landmasses over geologic history	1
How to integrate into a physics unit on waves	1
Yellowstone? Relationship between quakes and volcanoes	1
More information about the internal viscosity of Mars. Is it more/less rocky than anticipated.	1

Table 4: Suggestions for improving the Seismic Data from Mars session and their frequency they were proposed.

Improvement(s)	Frequency
Use portable microphone	2
Show working examples of how to use IRIS in the classroom	1
Something hands on	1
Elementary level activities	1
More animations & Infographics	1
Describe the faulting of Mars. Why?	1

Table 5: Participant's responses to "Is there anything else you would like to share?" and their frequency.

Share	Frequency
Well done! Thank you!	4
No	2
Fun to hear about the IRIS resources. So knowledgeable and enthusiastic	1
Congrats on the successful landing and deployments. Truly incredible.	1
NASA should make a complete physics curriculum	1
Wish the data was available	1

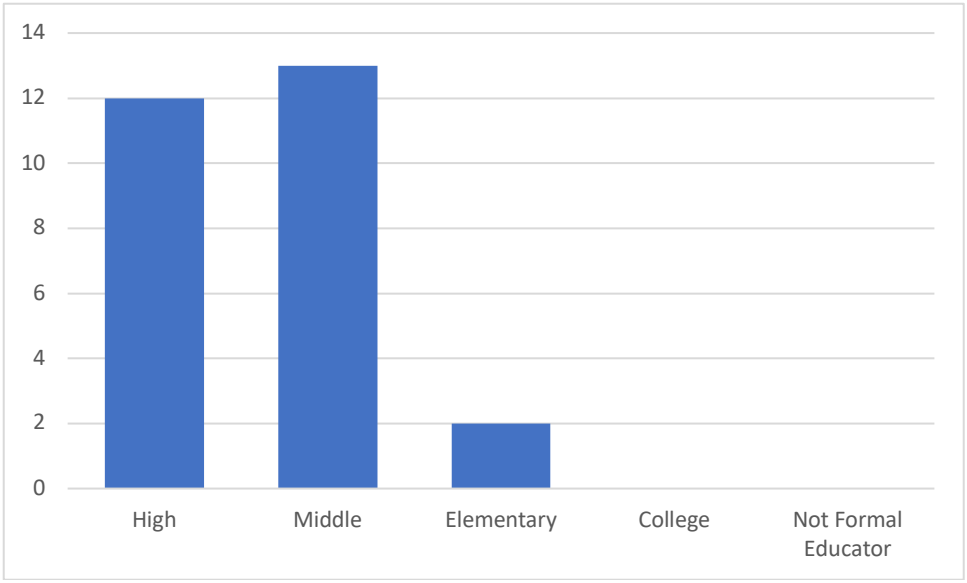


Figure 4: Distribution of participants' teaching situation

Table 6: Maximum, minimum, and average teaching experience of workshop participants

Max	34
Min	1
Average	15

External NSTA Evaluation

Please indicate the degree to which you agree with the followings statements.	**Average score (scale = 1 to 5, where 1=strongly agree)**	**(n)**
I selected this session for immediate classroom use.	NA	0
I selected this session based on the reputation of the speaker.	NA	0
I selected this session to improve my personal pedagogical knowledge/skill.	NA	0
I selected this session to improve my science content knowledge.	NA	0
The session met my needs.	NA	0
The information presented was clear and well-organized.	NA	0
Safe practices were employed.	NA	0
The session avoided commercial solicitation.	NA	0
The session should be repeated at another NSTA conference.	NA	0

Appendix I: *Social Media Content Calendar for NSTA*

Facebook

Friday March 22 and Wed April 3

Are you going to @NSTA? Please join us for one (or more!) of the following sessions or Share-A-Thons.

Thursday, April 11:
Bring NASA's Seismic Data from Mars to Your Classroom!
3:30–4:30 PM | America's Center, Room 242
Explore data from the first seismometer on Mars! Learn about Mars' interior using IRIS's free software, lessons, and data from NASA's InSight mission.

Friday, April 12:
Meet Me in the Middle Share-a-thon
3:00–4:30 PM | Marriott St. Louis Grand, Majestic D/E

Saturday, April 13:
Accounting for Uncertainty in Scientific Argumentation
9:30–10:30 AM | America's Center, Room 152
Uncertainty is an important part of scientific discourse, yet often overlooked in the classroom. Explore a simple heuristic to incorporate uncertainty into students' argumentation.
NESTA, UNAVCO, and IRIS Session: Are Earth's Plates Really Moving? Explore Earth Science Data
9:30–10:30 AM | America's Center, Annex
Explore and quantify plate motions and investigate models to support observations! Investigate IRIS earthquake and UNAVCO GPS data to determine the direction, rate, and type of plate boundaries, while exploring various models to support these observations.
NESTA Earth System Science Share-a-Thon
11:00 am–12:00 PM | America's Center, Annex
After an Earthquake: Real-Time Earthquake Data as a Hook to Encourage Answer-Seeking about the Geologic and Societal Context of the Event
2:00–3:00 PM | America's Center, Room 223
Hook students into Earth science after major earthquakes! IRIS's suite of free classroom products, data, animations, and visualizations are the foundation for your learning cycle.

Sunday, April 14:
NESTA and UNAVCO: Hands-On Demonstrations and Models for Your Earth Structure, Earthquake, and Plate Tectonics Unit
9:30–10:30 AM | America's Center, Room 225
Explore UNAVCO's collection of inexpensive physical models, which support students' understanding of abstract earthquake/plate tectonics-related concepts. Scientific practices and crosscutting concepts will be emphasized.

Be sure to stop by and visit us at Book 1861 to see the latest and greatest in earthquake education! (Plus, we have free slinkies and posters while supplies last). Mention that you saw this post and be entered a raffle to win a PocketLab!

TWITTER

Friday March 22
Will you be at #NSTA19? Be sure to put us on your schedule. We'll be talking about how to bring Mars data into your classroom, how to discuss scientific uncertainty and more! (link to page with info) #earthquake #Mars #data

Wed Mar 27
Going to #NSTA19? Come and visit us at booth 1861 for great resources and products related to #earthquakes and earth science! Mention that you saw this post and be entered a raffle to win a PocketLab.

Fri Mar 29
Do you teach about #earthquakes, waves or #platetectonics? Come and visit our booth at #NSTA19 (Booth 1861) to see how to incorporate real data into your classroom activities. Mention that you saw this post and be entered a raffle to win a PocketLab.

Mon April 1
Will you be at #NSTA19? We have a host of activities and products that can help you teach about #earthquakes, waves and #earthscience. Come to one of our sessions (include link to page) or visit us at Booth 1861. See you there!

Tues April 9
Safe travels to #NSTA19. We'll see you there! (link to activities page)

Wed April 10 – AM
Bring NASA's Seismic Data from Mars to Your Classroom!
Thurs April 11, 3:30–4:30 PM | America's Center, Room 242
Explore data from the first #seismometer on Mars! Learn about Mars'
interior using IRIS's free software, lessons, and data from @NASAInSight mission. #NSTA19

Do you teach about #earthquakes, waves or #platetectonics? Come and visit our booth at #NSTA19 (Booth 1861) to see how to incorporate real data into your classroom activities. Mention that you saw this post and be entered a raffle to win a PocketLab!

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Thurs April 11 - PM
Join us at the Meet Me in the Middle Share-a-thon | Saturday, April 12,
3:00–4:30 PM | Marriott St. Louis Grand, Majestic D/E #NSTA19

Do you teach about #earthquakes, waves or #platetectonics? Come and visit our booth at #NSTA19 (Booth 1861) to see how to incorporate real data into your classroom activities. Mention that you saw this post and be entered a raffle to win a PocketLab!

Friday, April 12 - AM
TODAY! We hope to see you at the Meet Me in the Middle Share-a-thon
3:00–4:30 PM | Marriott St. Louis Grand, Majestic D/E #NSTA19

Friday, April 12 – PM (spaced at hour intervals starting at 12 EST)

1) Accounting for Uncertainty in Scientific Argumentation | Sat, April 13,
9:30–10:30 AM | America's Center, Room 152 #NSTA19

2) Uncertainty is an important part of scientific discourse, yet
often overlooked in the classroom. Explore a simple heuristic to
incorporate uncertainty into students' argumentation.
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1) NESTA, UNAVCO, and IRIS Session: Are Earth's Plates Really
Moving? Explore Earth Science Data | Sat, April 13,
9:30–10:30 AM | America's Center, Annex (@NESTA, @UNAVCO) #NSTA19

2) Explore and quantify plate motions and investigate models to
support observations! Investigate IRIS earthquake and @UNAVCO #GPS
data to determine the direction, rate, and type of plate boundaries,
while exploring various models to support these observations.

NESTA Earth System Science Share-a-Thon
Sat, April 13, 11:00 am–12:00 PM | America's Center, Annex (@NESTA) #NSTA19
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1) After an #Earthquake: Real-Time Earthquake Data as a Hook to
Encourage Answer-Seeking about the Geologic and Societal
Context of the Event | Sat, April 13, 2:00–3:00 PM | America's Center, Room 223 #NSTA19

2) Hook students into Earth science after major earthquakes! IRIS's suite of free classroom products, data, animations, and visualizations are the foundation for your learning cycle

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1) NESTA and UNAVCO: Hands-on Demonstrations and Models for your Earth Structure Earthquake and Plate Tectonic Unit | Sun, April 14, 9:30-10:30 AM | America's Center, Rm 225 #NSTA19

2) Explore @UNAVCO's collection of inexpensive physical models, which support students' understanding of abstract earthquake/plate tectonics related concepts. Scientific practices and crosscutting concepts will be emphasized.

SUNDAY, April 14
1) TODAY! @NESTA and @UNAVCO: Hands-on Demonstrations and Models for your Earth Structure Earthquake and Plate Tectonic Unit | Sun, April 14, 9:30-10:30 AM | America's Center, Rm 225 #NSTA19

2) Explore @UNAVCO's collection of inexpensive physical models, which support students' understanding of abstract earthquake/plate tectonics related concepts. Scientific practices and crosscutting concepts will be emphasized.

Appendix J: 2019 NSTA Booth Exit Interview Guide and Results

During the 2019 NSTA national conference 22 attendees who visited the IRIS booth were asked to complete a short semi-structured interview about their experience, what brought them there, and what they might use and share. Interviews were all conducted on the second day of the show.

Summary

- All of those interviewed reported recognizing NASA (100%) while most recognized IRIS (95%), USGS (86%), and NSF (75%). However, half of those interviewed (50%) knew the IRIS logo from visiting the IRIS booth.
- All of those interviewed (100%) reported learning about one or more resources they intend to use or explore and interviewees were confident (9%) or very confident (91%) that they would be able to access that/those item(s) later. Importantly, all of those interviewed (100%) knew that IRIS does not charge for their resources.
- 100% would recommend IRIS's resources to a colleague as easy to use, engaging, and free.
- Visitors to the booth came by because they attended a session earlier and heard about it, and were attracted by the posters and Slinkys.
- A total of four (18%) of those interviewed reported receiving the email announcing the IRIS booth. However, most indicated that they had stopped reading the NSTA emails because there were so many.
- No one reported seeing any Tweets or Facebook posts promoting the IRIS booths or sessions because they are not yet followers (some said they would now start).
- 18% of those visiting the booth reported attending an IRIS session before visiting the booth and all of those (100%) heard about the booth while at their session.
- Those interviewed taught elementary (9%), middle (59%), or high school (32%) and a variety of subjects including Earth Science (37%) and Integrated/General Science (18%).
- Interviewees reported teaching for an average of 13.5 years with a range of one to 34.

Detailed Findings

Which of the following organizations have you heard of or seen before?

	2018	2018 %	2019	2019 %	Total	Total %
NASA	29	97%	22	100%	51	98%
IRIS	24	80%	21	95%	45	87%
USGS science for a changing world	28	93%	19	86%	47	90%
NSF	-	-	17	77%	17	77%

UNAVCO	0	0%	1	5%	1	2%
earthscope	9	30%	1	5%	10	29%
SCEC AN NSF+USGS CENTER	0	0%	0	0	0	0%

How did 2019 interviewees know the IRIS logo?

- *Booth today (11)*
- *From another conference*
- *Didn't know before*
- *Resources from teaching for last five years. At ISTE conference 2011*
- *From website*
- *Online search (2)*
- *Ham radio operator. Art workshop. Instructor had an IRIS seismograph.*
- *Went to session Thurs*
- *Session. Natural hazards (not an IRIS session)*
- *Session yesterday. Mars quake.*

While at the IRIS booth, did you learn about one or more resources that you intend to use or explore?

	2018	2018 %	2019	2019 %	Total	Total %
Yes	30	100%	22	100%	52	100%
No			0	0		

How do you intend to use that/those items?

- *Demonstrations and labs*
- *W 9th grade honors*
- *App and JamaSEIS TO LOOK AT REAL data (3)*
- *With plate tectonics. In planets unit. How do we know interior stuff? New Mars info*
- *5th grade science show them their region. Plotting location so they see patterns*
- *Web based sims*
- *For seismic waves. Layers of Earth. Where coco. Originate*
- *Class demo*
- *With geology unit (3) Show focus depth to c subduction zones*
- *Online demos. Lessons. Mars data*
- *Demos and add-ons to show actual earthquake data*
- *Use in my math and physics classes*
- *For plotting graphs for seismic activity in California and Missouri*
- *One to one tech. Students explore natural disasters (am in a STEM school)*
- *Online real time Mars*
- *Slinky actiivty*
- *Teaching earthquakes next year in 7th for the 1st time*

- *All new to this topic so will first use to learn the content myself*
- *Super intrigued. Will look for chemistry connections*

How confident are you that you will be able to access that/those item(s) later?

	2018	2018 %	2019	2019 %	Total	Total %
Very confident	16	53%	20	91%	36	69%
Confident	12	40%	2	9%	14	27%
Somewhat confident	2	7%	0	0%	2	4%
Not yet confident	0	0%	0	0%	0	0%

Overall perception of IRIS resources

Does IRIS charge to access and use any of the resources that you explored?

	2018	2018 %	2019	2019 %	Total	Total %
Yes	1	3%	0	0	1	2%
No	27	90%	22	100%	49	94%
Unsure	2	7%	0	0	2	4%

Based on what you saw at the booth, would you recommend IRIS's educational resources to your colleagues?

	2018	2018 %	2019	2019 %	Total	Total %
Yes	30	100%	22	100%	52	100%
No	0	0%	0	0%	0	0%
Unsure	0	0%	0	0%	0	0%

If so, how would you describe them?
Note, It seemed as though "free" was mentioned more often because it was just asked about.

- *Free resources (4)*
- *Interactive (3)*
- *Animations (3)*
- *Relevant info from knowledgeable people (3)*
- *Easy to use (3)*
- *Easily accessible visual aids.*
- *Worth exploring.*
- *Very easy to talk about the product.*
- *One of best free resources. Better than some paid.*
- *Helpful for studying earthquakes.*
- *Chromebook compatible.*
- *Already have. Excellent data resources and animations.*
- *Looks nice/.*
- *Check out website. Lessons. Interactive tools.*
- *Tools teaching earthquakes and math behind it.*

- *Will share in the college methods course I teach as good for teaching about different types of rocks.*
- *Like access to tech with up to date data.*
- *Already have. Actual data on Mars we can use next year.*
- *Students can use with no intro.*
- *Very useful for SYEM lessons w technology.*
- *Will have students collaborate using it to do research.*
- *Specific. Good resources.*
- *Sims are awesome. Will use at the beginning of a unit and have them find patterns in earthquakes and where they occur.*
- *Live up to date real data.. U can change. Up-to-date.*

Attraction of visitors to the booth

Describe what attracted you to stop at the IRIS booth today?

- *Went to session(s) (6)*
- *Natural hazards calendar (4)*
- *Slinky (5)*
- *Earthquakes and data (2)*
- *Computer simulation*
- *Seismic activity evidence*
- *Info on earthquakes. Saw sign for it*
- *Had used before*
- *Heard about seismograph program*
- *Popups*
- *Wanted to find out more*
- *Because I teach seismology*

Did you receive this email announcing the IRIS Booth?

	2018	2018 %	2019	2019 %	Total	Total %
Yes	11	38%	4	18%	15	30%
No	18	62%	17	82%	35	70%

Most people said they were getting so many emails from NSTA that they stopped looking at them.

Did you see any Tweets or Facebook posts promoting the IRIS booths or sessions?

	2018	2018 %	2019	2019 %	Total	Total %
Yes	-	-	0	0	0	0
No	-	-	21	100%	21	100%

None of the interviewees were currently following IRIS on social media, but 5 o 6 thought they would in the future. Suggest adding “not yet” as an option.

Did you attend an IRIS session while at NSTA?

	2018	2018 %	2019	2019 %	Total	Total %
Yes	4	31%	4	18%	8	24%
No	9	69%	17	82%	26	76%

If yes, was the IRIS booth mentioned at the session?

	2018	2018 %	2019	2019 %	Total	Total %
Yes	3	75%	4	100%	7	87%
No	1	25%	0	0%	1	13%
		Unsure	0	0%	0	0%

Demographics

What level do you teach?

	2018	2018 %	2019	2019 %	Total	Total %
Elementary	0	0%	2	9%	2	4%
Middle	16	53%	12	59%	28	55%
High	12	40%	7	32%	19	37%
College	1	3%	0	0	1	2%
Not a teacher or instructor	1	3%	0	0	1	2%

Which of the following best describes your primary teaching responsibilities?*

	2018	2018 %	2019	2019 %	Total	Total %
Biology	0	0%	1	5%	1	2%
Chemistry	1	3%	1	5%	2	4%
Earth Science	21	72%	8	37%	29	57%
Physics	3	10%	2	9%	5	10%
Elementary	0	0%	1	5%	1	2%
Environmental Science	1	3%	0	0	1	2%
Physical Science	0	0%	1	5%	1	2%
Integrated/General Science	3	10%	4	18%	7	13%
Other	0	0%	4	18%	4	8%

Other described

- *Earth. Physical*
- *Gifted*
- *Math physics chemistry*

*Note – suggest allowing more than one choice here.

How many years have you been teaching?

	2018	2019
Mean	14	13.5
Min	1	1
Max	31	34