

3. Description of Programming

3.1 General Guidance for Presenters

This section describes the process of guiding presenters and provides information about best practices for delivering STEM programming within YIC Centers.

3.1.1 The Role of STEMCAP Programming

Students in Centers receive science education congruent with state-mandated curriculum standards and learn about general science concepts and topics during the school day. STEMCAP provides deep dives into a subset of science topics and highlights the role of science in the world and students' own lives. **Presenters focus on their areas of expertise and explore topics in detail rather than providing overviews of broad scientific subjects.**

3.1.2 Methods to Deliver Workshops

Presenting information in multiple modes benefits YIC by allowing for flexible and creative presentations that may best fit their needs and/or preferences. Highlighting the relationships between science and students' lived experiences increases YIC engagement. Many have not participated in engaging, rigorous science curriculum, and so may not have enthusiasm for learning science – or may even be resistant to science as a topic.

STEMCAP connects the topic of each workshop with a broad array of interests and backgrounds. For example, at the beginning of a workshop on atmospheric science, a presenter may talk about the role of weather predictions in scheduling athletic events. Connecting science and students' daily lives makes it easier for them to engage with the rest of the workshop.

Students are often interested in the science content of the presentation and the presenter as a person. Sharing personal stories ("how I got to be a scientist") enhances STEMCAP programming and allows students to see themselves as science-capable, and emphasizes that scientists do not have to give up the rest of their identity. **Presenters are encouraged to devote 5-10 minutes to describe the nature of their work**, the reason they chose that career, and what skills and academic credentials they pursued to prepare themselves for their current position.

STEMCAP emphasizes visual information over written text on PowerPoint slides and other presentation materials because some students face challenges in reading. Large photos or simplified graphics illustrate points; written text is used to emphasize them (see Figure 5). STEMCAP shares slide templates with presenters and helps with the formatting of their slides to ensure that presentation materials are well-designed while reducing the time commitment of scientists and artists.

Tips for Presentation Materials:

- Although visual representations aimed at scientists are often data-rich charts and graphs, visuals aimed at YIC should be engaging images rather than technical figures.
- Limit text to a third of the slide or less. Use 18-point font or larger.
- Avoid artistic or distracting fonts.
- Colors on the slides should be contrasting, as the quality of projectors or screens at Centers can vary, and low-quality projections make low-contrast slides challenging to see.
- Break up educational content and steps of activities into several individual slides.
- Include interactive aspects. Allow students to ask questions, leave time for them to answer questions posed, and include activities that promote collaborative thinking and learning.
- Do not include images that could be considered sexual or graphic (e.g., young field assistants of any gender in bathing suits or grisly images of injuries).

STEMCAP advises presenters to include a maximum of 25–35 minutes of content, with intervals built-in for students to ask questions or make comments. Presenters should be sure to specify how they would like students to ask questions (e.g., raising hands, Q cards, wait till the end). Following content delivery, STEMCAP leads discussions and encourages questions to spark conversation between students and presenters. STEMCAP does not require PowerPoint presentations. Workshops range from 50–90 minutes. STEMCAP works with presenters to determine the best use of the time allotted for each workshop.

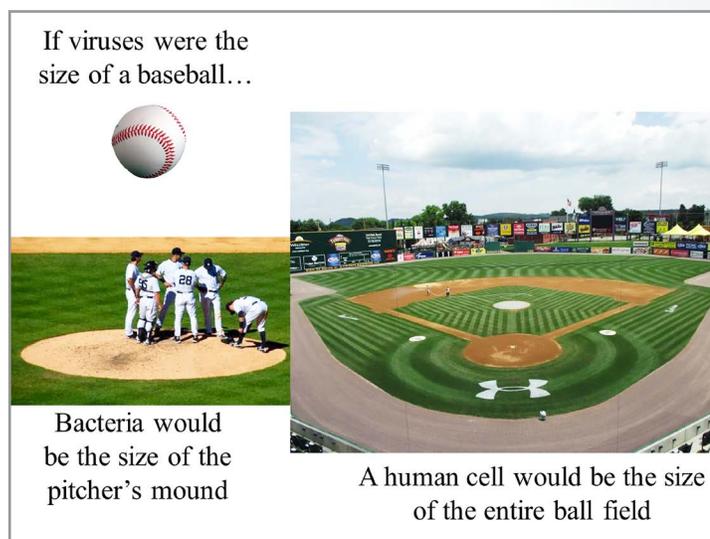


Figure 5, Example of a Slide

3.1.3 Considerations for Working with YIC Teachers

Science teachers emphasize basic science to meet district curricular requirements. While they are enthusiastic to hear about recent developments in STEM fields, teachers likely have many constraints on time and technology, and including STEMCAP programming can be challenging.

3.1.4 YIC Center Environments

Centers may experience lockdowns or quarantines at short notice, so presenters must be aware that cancellations or rescheduling can occur at any time. It is important to inform presenters of this to temper their expectations and avoid disappointment in the event that they are unable to present on the day of their workshop.

Centers provide YIC with sentence-mandated health services and treatment programming. It is common for students to be taken out of class during STEMCAP workshops to attend therapy, meet with caseworkers, or attend court appointments. These appointments cannot be changed unless otherwise stated and arranged by the YIC teacher. **STEMCAP alerts presenters that students may periodically leave the classroom. Presenters should not draw attention to students removed from class.**

One goal of presenters and STEMCAP staff members is to form positive relationships with students.

During STEMCAP workshops, YIC teachers and JJS staff are responsible for monitoring student behavior. Therefore, STEMCAP staff and presenters do not perform typical classroom management such as disciplining a student for talking to peers during a presentation or requiring a student to participate in an activity when he/she/they are not on task.

3.1.5 Process for Presenter Preparation

When a scientist, artist, or community practitioner is interested in leading a workshop with STEMCAP, they are required to complete a survey that indicates their interest, availability, and other logistical details for STEMCAP staff. Download the Presenter Application [here](#). STEMCAP then contacts and leads the presenter through the steps of preparing, editing, and presenting a workshop (see Figure 6). The total time commitment to lead a workshop for presenters is 5-8 hours.

Tips for Collaborating with Teachers:

- Be mindful of teachers' time constraints, needs and any pressure they may feel to reach curricular goals or maintain a consistent schedule.
- Learn about any pressure teachers may feel to reach curricular goals or maintain a consistent schedule to see how your proposed programming can be complementary.
- Check in regularly via email to remind teachers of upcoming workshops.
- Frequent communication helps foster a positive relationship with the teachers.

Tips for Presenters:

- Avoid saying things such as, "Oh no, I wish you didn't have to miss this activity," as this kind of statement can make students feel bad about leaving and/or missing out.
- Do not ask students or their teachers why a student is leaving the classroom or when the student will return.

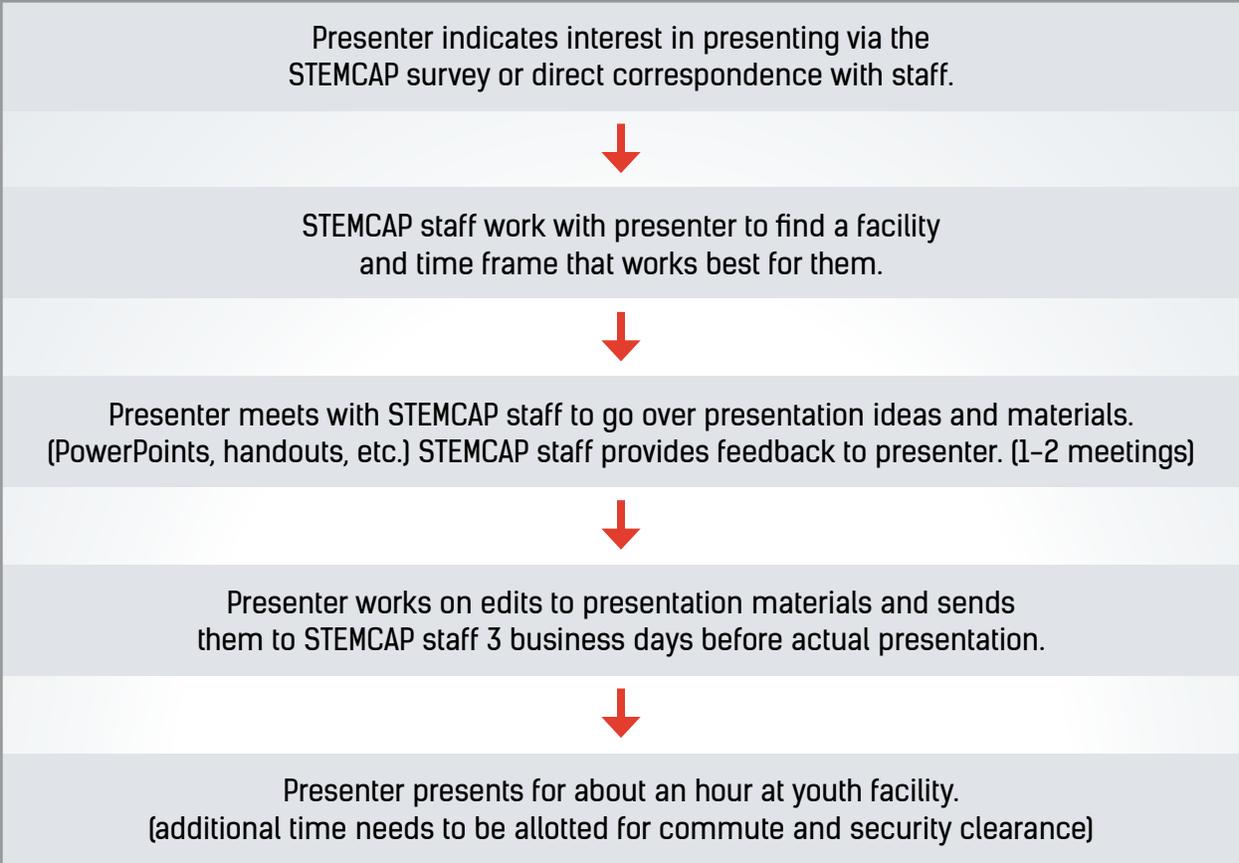


Figure 6, STEMCAP presenters' process.

3.2 Time Commitments

STEMCAP Staff

Presenters must dedicate time to build and review the workshop before delivering the presentation. Presentation delivery time includes commuting to the Center, set-up, and clean-up. On average:

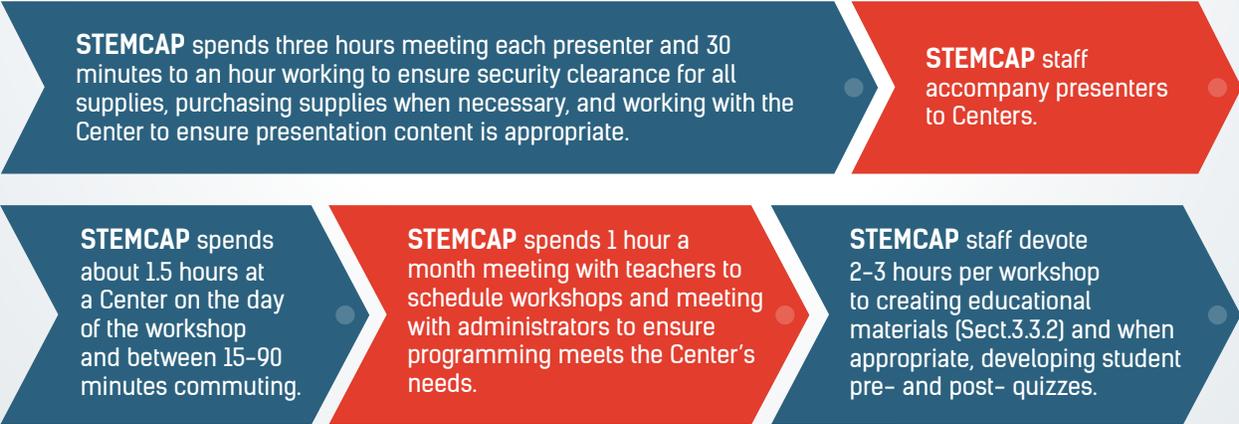


Figure 7, STEMCAP time commitments.

Presenters

In addition to the breakdown above, presenters are asked to voluntarily devote 30 minutes to completing formal evaluation surveys (optional) and 1–2 hours to meet with STEMCAP’s evaluation team for a focus group and interview to provide feedback on their experience working with STEMCAP.

3.3 Workshop Supplies and Materials

3.3.1 Supplies

Due to security requirements enforced by the Center, supplies, demonstration materials, and other objects are subject to review by YIC staff. STEMCAP personnel act as the liaison between Center staff and presenters. **Presenters must provide a list of supplies 2 weeks before their workshop to allow STEMCAP adequate time to ensure approval of all materials.**

Allowable materials vary substantially from Center to Center. Center staff and teachers will determine what is and is not allowed. To prepare for an activity, STEMCAP clears a list of supplies to ensure compliance with security protocols. The primary security concern is that students will use items to harm themselves or others. Any item capable of inflicting self-harm, including through ingestion, or capable of being used as a weapon, is typically not permitted (see Figure 8 for a reference list).

Typically supplies that are not allowed include:	Most Centers in Utah allow:
metal objects	soft objects (example: cotton balls)
sharp objects	crayons/markers
paper clips	short string (less than 6 inches)
long string or rope	card stock
scissors	non-toxic paint
knives	bendable plastic
staplers and staples	magnets
toxic substances	non-toxic glue
Pens	clay
Glass	plants

Figure 8, List of supplies typically restricted or allowed in Utah YIC centers.

Some exceptions to these rules can be made. For example, hazardous items are labeled or numbered to ensure that they cannot be removed from the classroom by a student. STEMCAP offers to purchase all workshop materials, but many Centers have art classrooms with pre-approved, labeled, and numbered art supplies, including crayons, paint brushes, safety scissors, construction paper, tape or glue, and non-toxic paint. All Centers in Utah provide notebooks or printer paper and pencils.

3.3.2 Creating Educational Materials

STEMCAP offers reading packets and worksheets to accompany workshops. STEMCAP staff work with presenters to identify specific topics and accompanying articles students should read in preparation for workshops that can provide an introduction to stir excitement and attention. One reading provides a general overview of the topic, and two to three readings connect the topic to current science news or cutting-edge research. **The reading packets are 6–8th grade reading level unless the teacher requests a different level for a particular class.** Input is sought from teachers on their classes' reading levels.

STEMCAP uses six educational resource websites that provide a reading level for their articles. STEMCAP uses the online resource *Readability Formulas* to determine the reading level when a reading level is not provided⁷. **STEMCAP creates an accompanying "Guided Reading Questions" worksheet** designed to help students extract the main concepts from the reading packet. These questions require students to answer content directly stated in the text. For example, an appropriate question is, "According to the author, how many species live in the Great Salt Lake?"

STEMCAP's "Reading-Based Discussion Questions" list helps facilitate discussions between students and their teacher after completing the reading packet.

Suggested Discussion questions have students:

- Reflect and expand upon what they have read
- Apply what they have read to a broader context
- Question the ideas of the readings
- Discuss how the readings relate to one another

For example, an appropriate discussion question is: "Why do you think it is important to study the Great Salt Lake ecosystem?" STEMCAP provides 8–12 discussion questions. The questions are accompanied by a teacher guide that lists possible topics to discuss with students in response to each question. When possible, STEMCAP asks teachers to lead students through the discussion question one school day prior to the workshop.

Tips for Choosing Workshop Supplies:

- Circumstances at Centers frequently change. STEMCAP submits requests for approval on all workshop supplies, even if an item has previously been approved.
- Check with a Center to see 1) what supplies they may have on hand and 2) if your program is allowed and/or advised to use them before purchasing materials for a workshop.
- Don't be afraid to ask Centers for permission to bring in supplies that they may turn down. You may be pleasantly surprised what materials you can bring in if you are diligent about monitoring and labeling your materials to ensure nothing is left behind after your workshop.

Tips for "Guided Reading Questions:

- Create a separate list of questions for each article so that students know which questions will guide them through which article.
- Ensure that answers to all questions are found directly in the article.
- Only focus on one article at a time. Do not ask students to reflect on previous articles (this will come in discussion questions).

STEMCAP sends the reading packet, the “Guided Reading Questions,” and the “Reading Based Discussion Questions” to teachers for review before finalizing them. If a teacher states that a particular reading is at too high a reading level, STEMCAP will either replace the reading or provide an “abridged” version that includes simplified language, shortened sections, and definitions. The class may not have time to read the packets before the workshop – or teachers may choose not to have students do the readings – so STEMCAP informs presenters that students may not have the background knowledge provided by the reading packet.

Educational materials vary and are more robust for *Conservation Projects* (Sect. 5.1.5) and *Series Programming* (Sect. 6.2.4).

3.4 Programming Overview

STEMCAP offers three program types: 1) *Topical Workshops* (Sect. 4), 2) *Mission STEMCAP* programming series (Sect. 6), and 3) *Conservation Projects* (Sect. 5).

3.4.1. Program Type 1: Topical Workshops

Topical Workshops focus on the specific research, career, or scientific endeavors of the presenter. These workshops fall into five types:

- a) *Science Right Now!* workshops connect students with cutting-edge scientists to highlight ongoing research and provide students with the sense that science is current and dynamic (Sect. 4.2).
- b) *Art-Science* workshops provide opportunities for YIC students to learn and apply scientific principles and research in practical and creative ways and link science to other ways of knowing and communicating in the arts and humanities (Sect. 4.3).
- c) *Objects from Nature* workshops connect students with museum professionals and naturalists who help students practice observation techniques while learning about the role of natural history in ongoing discovery, the role of nature in human life, and the role of observation in science (Sect. 4.4).
- d) *Portal to Science* workshops connect university research scientists to YIC to introduce the scholarly, physical, and collaborative environment of academic labs and demystify lab work (Sect. 4.5).
- e) *Conservation* workshops focus on specific contemporary issues in which wildlife, ecosystems, or natural resources are at risk (Sect. 4.6). These are often a component of longer STEMCAP Conservation Projects (Sect. 5), though they can take the form of a single-day workshop.

3.4.2. Program Type 2: Mission STEMCAP

Partners facilitate activities centered around five environmental “Grand Challenges”⁸ to convey science’s role in society and build students’ civic engagement by encouraging them to participate in local community projects. Every year, each Center focuses on one of the five Grand Challenges. Centers receive content over 8-10 consecutive days (Sect. 6).

3.4.3 Program Type 3: Conservation Projects

Students become familiar with best practices in conservation through hands-on projects that last for 6-8 weeks. These projects provide students with experiences that offer the sense of fulfillment that comes with helping local ecosystems (Sect. 5).