STEM Career Engagement Guide

Collaborating with STEM Professionals in the Middle School Classroom

So, You Want to Engage Middle School Students in Thinking About STEM Careers?

Anyone who has spent time with middle school students knows that they are a beautiful mix of elementary school curiosity and wonder and high school passion and energetic thoughtfulness. They are beginning to figure out who they are and where they want to go on the pathway of life. With this blossoming sophistication and enthusiasm comes an emerging interest in career and college possibilities. A quick peek at almost any published list of futuristic careers is filled with jobs that fall firmly into the realm of Science, Technology, Engineering, and Math (STEM). STEM career exploration must be an iterative process, beginning with our youngest learners, that occurs over many years and in many different ways. Middle school students need an opportunity to begin exploring STEM career possibilities as they look ahead to their futures. Voya STEM Fellows recognize the importance of bringing STEM professionals into the classroom, have found value in helping students step outside of the classroom walls into STEM career spaces. Educators need to learn how to advocate for the importance of exposure to STEM careers in all classrooms, for all students.

Great STEM professional speakers can help middle school students find a sense of awe in exploring future career pathways. It is the responsibility of STEM educators to give their students a buffet experience of possibilities that reaches beyond the more traditional STEM careers of doctor, scientist, engineer, or mechanic. Interactions with STEM professionals can help students uncover passions and spark interests by

taking advantage of the fact that middle school students are young enough to be fascinated by novelty and uniqueness. Helping students keep their career pathways open will facilitate possibilities for those students in high school and help them think in terms of classes they might want to take, rather than college major choices or unrealistic job options. Bringing the people behind STEM into an educational setting helps middle school students to focus on their own interests and competencies and gives them space to develop STEM mindsets.

This guide is designed to help educators bridge the gap between STEM careers and educational spaces and provides educators with the tricks and tools they need to facilitate STEM career learning experiences for their students.

Planning for STEM Career Exposure Success

How can educators prepare their students and their visiting STEM professionals to get the most out of a STEM career presentation? What types of activities should educators think about? What will get middle school students excited about interacting with the STEM world?

STEM Career Engagement Guide

Collaborating with STEM Professionals in the Middle School Classroom

Selecting Speakers

Representation matters - students need to see successful professionals who look like them and come from similar backgrounds in order to be able to consider possible particular career paths. While sharing stories about notable women and persons of color in STEM (e.g. "Not the Science Type," If/Then She Can) can be helpful, bringing in professionals from diverse backgrounds to speak with students can have a far greater impact. Great resources for finding STEM presenters that represent diversity in STEM careers include Skype a Scientist and the WISE program from Texas A&M. Sometimes making cold calls to local professionals can net incredible presentation possibilities. Educators should check with their state science teachers' association as well as any STEM action centers that have been established in their state to see if they have mentorship or speaking lists already established.

Preparing Speakers

Working with the STEM professionals in advance to establish rapport is essential. While many professionals are excited about making connections with middle school classrooms, not all are sure how to find an appropriate entry point. Part of establishing relationships with speakers includes checking on possible technology needs for the presentation, as well as working with possible time zone differences. Preparing students for guests in the classroom, in-person, or virtually, can be a great way to build excitement for the STEM experience. Encourage students to share their curiosities and wonders as a way to determine which career fields they may be most interested. Work with the students ahead of time to take on a role as part of the presentation. Middle school students are very capable of serving as a greeter, time manager for the speaker, or helping as a question prompter to keep the presentation flowing smoothly. Students can spend time in the days leading up to the presentation practicing video and chat etiquette and generating some questions that they might want to ask the presenter.

STEM professionals are great at what they do in their day jobs, but they may need a few tips when it comes to making connections with middle school students. Encourage the presenters to provide some vocabulary words that are specific to their career in advance to help students expand their understanding of STEM fields. This could include words that are cognates of terms that students are already familiar with to build connections to prior knowledge and to increase student comfort levels with that STEM discipline. Another great idea is to ask the speaker to prepare a visual display of artifacts or images that can engage students during the presentation.

Help the STEM professional to create or locate an engaging activity to do with students or show them interesting scientific phenomena. Don't be afraid to invite the speaker to bring a little workplace swag with

them because students love hands-on connections to learning. Remind the speaker that it is okay to share personal stories, passions, and career pathways with the students to help make the experience more relatable and authentic. This might include helping the STEM professional understand more about the culture of the students that they will be meeting. Start small with a meaningful experience and build from that. One well-planned, powerful experience is much better than several 'easy gets'.

Preparing the Classroom

Educators play an important role in helping a STEM career presentation be impactful. On the day of the big event, build time and space into the presentation for the STEM professional to make connections with the classroom culture. Just like any other day in a middle school classroom, the educator will need to be ready to be in multiple places at once and fill several supporting roles. Circulate the room while the speaker is talking to help the students to stay focused and engaged, but also be aware of any technological needs of the speaker, either in person or virtually, that might require some management. Using a pad of sticky notes to plant some questions with students around the classroom can help them to focus on important information that the STEM professional shared during their talk.

Middle school students are at an age where they are starting to explore social relationships and boundaries, so guest speakers become a perfect practice ground for social interactions. Showcasing their attentive and active listening skills during the presentation helps students to engage in more authentic career conversations. Sticky notes, white boards, and even virtual bulletin boards are a great place for students to jot down their notices and wonders during a presentation so that they are prepared for Q&A time at the end of the speaker's presentation.

Encourage students to use their previous knowledge and any prior research that they may have completed to help make connections between themselves and the STEM professional. Expressing gratitude for the speaker does not have to wait until after the presentation or until after they have left your classroom. Think about having students use nonverbal communication skills like body language and finger snapping as a way to connect with the STEM professional.

Honoring the Collaboration and Keeping the Connection

After-care is a critical step in any STEM career presentation. Schools and educational spaces are often busy and overscheduled so it is easy to overlook the types of follow-up activities that can really enhance a STEM professional's visit in your classroom. Share the good news about the STEM presentation on school social media and, if school policy allows for it, include pictures of the students and the speaker together. Encourage students to create content for the school website or social media accounts so that student voice is part of the process. Give the STEM professional some school swag and help them feel like they are a valued member of

the educational community so that the partnership can be an ongoing one. Create opportunities for the presentation content to be a part of cross-curricular conversations by sharing about the experience at staff meetings, in professional learning communities, and by including school administrators in the feedback loop.

Research indicates that middle school students retain and connect better with information when they have multiple touch points with that information. Students can complete reflections or exit tickets immediately after the STEM career experience to provide feedback on the interaction. Technology helps students share takeaways in a quick and engaging manner. Creating a Flip or a Padlet to have ready at the end of the presentation is a great idea. A low-tech alternative is to have them fill in a "tweet sheet" before the speaker leaves and share their thoughts in 280 characters plus a hashtag.

Middle school students love to be creative and have ownership over their learning. Have them create doodle notes, sketchnotes, or Google doodle with this template (or code a doodle) to represent their new understandings helps them make connections between themselves and the STEM possibilities that were shared with them. Since middle school students are exploring social relationships, handwritten thank you notes to the STEM professional are a great way to help them work on social competencies. Encourage the students to share this experience with their family and friends when they get home.

Setting the stage for a continued collaborative relationship with STEM professionals includes providing

feedback to them about how the presentation was received, as well as motivating them to consider being a part of future interactions with students. In a reciprocal partnership, educators can help the STEM professional to network with other educators and the STEM professional can help put the educator in touch with other potential STEM presenters.

Encourage the speaker to leave contact information for the students to reach out with questions since this can set up an authentic mentoring relationship for those students as they move into high school and the workforce. Create a STEM classroom version of LinkedIn for networking purposes to get the most out of these professional connections.

The information in this guide is structured to support all educators and students in their STEM career journey by connecting classrooms with professionals. Providing exposure to a variety of STEM career possibilities can inspire the next generation of problem solvers who have the skills to address the challenges of tomorrow. For more great ideas and additional support, be sure to view the elementary and high school STEM Career Engagement Guides.

The Middle School STEM Career Engagement Guide was written by NNSTOY's Voya National STEM Fellows Carly Bowden, Haley Bull, Allison Dopler, Melyssa Ferro, Jessica Sanders, Kristen Record, Dyane Smokorowski, and Kali Tomlinson, with design and editing by Katherine Bassett.