



STEM in Schools 2019: Information pack for schools

Thank you for registering your school to participate in CSIRO's STEM in Schools event, to be held on Wednesday 30 October 2019. In this pack you will find more information about the event as well as some links to resources and activities to help you make the most of the event.¹

If you have any questions or need any further information, please contact STEMinSchools@csiro.au

Event information

When

11.30am – 12.30pm in your time zone on Wednesday 30 October 2019

Aim of the event

This year, the STEM in Schools event will highlight Australia's global challenges — think everything from our ageing population to AI and climate change — and the diverse STEM professionals and careers using innovative science and technology to address them.

What

The event will kick off with a special 12-minute stimulus video broadcast (vodcast) at 11.30am featuring a panel of STEM professionals. Following the broadcast your class will participate in a hands-on activity about STEM careers and Australia's global challenges. We have provided suggested activities at Appendix 1.

Consider involving a local STEM professional

We encourage you to invite a local STEM professional into your classroom for this session. You might invite a STEM professional from the parent body or school community, or from the local community such as a vet, engineer, pharmacist, etc. Alternatively, a science or STEM teacher may be available. You could invite them to share their career story and answer student questions.

¹ If you have registered interest in hosting a parliamentarian and/or a STEM profession, we have been unable to arrange for either to visit your school.

Classroom activities

Following the stimulus vodcast your class will participate in a hands-on activity. We have provided suggested activities at Appendix 1, including an activity involving the creation of a podcast about STEM careers and Australia's global challenges. This activity is designed to help your students learn about different types of STEM careers and the STEM professionals working to solve Australia's global challenges. Once you have completed your podcast, you can submit it for a chance to feature on the STEM in Schools radio station that will be hosted on www.livefm.online. Your class can also listen to the podcasts other classes around Australia have made.

More information about global challenges is available in Appendix 2.

Preparation

To make your STEM in Schools event as easy and enjoyable as possible, there are a few things we recommend doing ahead of the event. If you need more information on any of these steps, or if you have any issues, please contact STEMinSchools@csiro.au

- Review the classroom activities and work with your students to prepare by researching global challenges (see Appendix 1 and 2)
- Ensure your school can access the stimulus podcast at www.csiro.au/STEMinSchools Please note that the broadcast will not be available until the afternoon prior to the event (i.e. on Tuesday 29 October). It is important to test your school's equipment and web access before the event. If you have trouble connecting on the day, the broadcast will remain available on this page after the event.
- Before the event, contact your STEM professional if you have invited one to discuss the day and how they will take part.
- If you or your visitors arrange media to be present at your event, please advise them of your school's media protocols. See Appendix 3 for media and social media suggestions.

Appendix 1 Classroom resources

Option 1: STEM careers podcast

Duration: 30 minutes

Task: Watch the STEM in Schools video broadcast on 30 October 2019 (duration approximately 12 minutes). Students then create their own STEM careers podcast, inviting any classroom guests to contribute.

Materials:

- Recording devices (e.g. smartphones, laptops, tablets, audio recorder)

Student activity:

Using the video broadcast as a stimulus ask students to create a podcast exploring STEM careers and global challenges. Students may undertake research for inspiration on STEM jobs or ask guests (e.g. STEM professional) to contribute to the recording. Example questions might include:

- Why is this job important?
- How does this contribute to solving global challenges?
- What skills and qualifications are required for the job?
- What will this job look like in the future?

More information on how to make a podcast is included below.

Broadcast to the world: Once complete, email your podcast to STEMinSchools@makingmedia.com.au for a chance to feature on the STEM in Schools online radio station. Listen to those of others at www.livefm.online

How to make and submit a STEM in Schools podcast

What is a podcast?

A podcast is a digital audio file that can be downloaded from the Internet, and listened to on a computer, tablet, phone or other mobile device. It can be listened to on-demand and produced and broadcast by anyone with a recording device, access to the Internet and a streaming platform.

The STEM in Schools podcast

After editing, your STEM in Schools podcast should be no longer than 15 minutes and capture at least some of the following:

- STEM professional's talk (if you have invited one)
- Students' questions and answers from STEM professional
- Students' perspectives of STEM responses to the global challenges (10 min)

Schools that make a STEM in Schools podcast and submit it to STEMinSchools@makingmedia.com.au by 5pm Friday 1 November have a chance to feature on the STEM in Schools radio station.

The podcast should not include any recording of the stimulus vodcast and must not be more than 15 minutes duration.

What preparation should you do?

Work with students to prepare their podcast questions

The best podcasts are those that tell listeners something new. Help your students to conduct research and prepare approximately five, well-thought out questions for your guests. These could be related to one or more of the six global challenge/s you have chosen as your theme.

Decide your approach

Here are two approaches you might consider:

- **Mobile devices:** Have your students use a phone or tablet to record the speakers and questioners. A student could be assigned to hold and move the device as quickly as possible between speakers to reduce "dead air", the silent pauses between questions and answers. There are many free audio recording apps available online for mobile devices that you can use to record your podcast. Apps such as *Opinion* (for iOS) and *Anchor* (for Android) are suitable.
- **An external microphone and recording equipment:** Have your students use an audio mixer, laptop or audio recorder, with two microphones. The guest would use one microphone to speak and respond to questions and the other would be shared by the students. Students should practice using the microphone prior to the podcast to get the best results.

Rehearsing will lead to better outcome

Audio quality will make or break your podcast. Poor quality audio makes it difficult for the listening audience to understand what is being said. Holding a device too close to the person talking can lead to audio distortion. Holding it too far away can lead to echo, hiss and low volume. Before the day, have your students rehearse recording on the device and then listen to their recording so they can optimise the settings and distance from those speaking.

Think about consent

It is important that people give consent before being recorded. This is even more important if the materials may be available over the internet. Ensure that the students ask whether the guests are prepared to be recorded and have the recording uploaded to a podcast. A clever way to do this is to ask the question at the start of the recording. The consent is edited out of the uploaded podcast but is kept digitally in the unedited, or master copy.

Editing the recording

Your students will need to edit the content they have recorded to make the podcast. This includes deleting irrelevant audio captured before the speakers start and after the speakers finish. Within the recording, dead air and other slip-ups and mistakes can also be deleted. Mistakes may accidentally delete or damage the master file, so only edit after the original is safely backed up.

Many apps for mobile devices and PCs have simple but sufficient editing capability, including *Audacity* and *GarageBand*.

Schools that elect to use recording equipment can edit using a wider variety of more technically competent software. Some prior experience using such software would help as it can be very complex, but it may also produce a superior audio quality outcome.

For support in producing your podcast please contact podcast.support@makingmedia.com.au

Submitting the podcast

Before uploading the podcast, teachers should ensure that the school has in place appropriate consents to upload students' voices to the online platform (online radio station, app) managed by Making Media.

If you would like the chance to have your podcast featured online, you must email your podcast in .mp3 format by 5pm Friday 1 November to: STEMinSchools@makingmedia.com.au

If the recording is more than 8 MB, it may be too large to email. Submission is possible using a free Internet-based computer file transfer service such as *We Transfer*.

Listening to all the podcasts

Broadcasts of STEM in Schools' podcasts will commence on Monday, 4 November 2019, and each will be replayed many times on the station until the end of Term 4 this year. A programming schedule will be released around 4 November so your school and local community will know when they can listen. You can also hear other podcasts from schools around the country.

Listen online at www.livefm.online or on a mobile device by downloading the Live FM app from the App Store (iOS) or Google Play (Android).

Further information

It is entirely voluntary for schools to create and upload podcasts. Schools should be aware that personal information, such as voices and names, may be included in the podcast and therefore ensure that appropriate consents are in place to support this. Making Media Australia will curate and host the podcasts provided by schools for uploading. CSIRO has no control over the content, editing, distribution, management or hosting of the content. If CSIRO wishes to use submitted materials in communications and promotional activities, we will contact you separately and seek appropriate permissions.

Option 2: Predicting the future

Duration: 30 minutes

Task: Watch the 12-minute STEM in Schools video broadcast on 30 October 2019. Students then predict the future and discuss their ideas with the class.

Materials:

- Butchers paper, white board or devices (e.g. laptop, tablets)
- Markers/pens/pencils

Student activity:

- Ask students individually to brainstorm where they see themselves in two weeks, two years and then 20 years (2-3 mins).
- Share reflections as a class (10 minutes)
 - Is it easy to predict the future?
 - Why is it important to predict the future?
 - Does thinking about the past help you think about the future?
 - Can we influence the future? What changes can we make now to reach a preferred future?
- Now ask students to think about what a piece of everyday technology would look like in the same time periods. Ask the students to make predictions about what might change and why. Example technology include mobile phones, wrist watches or cars (2-3 mins).
- Share reflections as a class (10 minutes)
 - Do you think your predictions will come to pass?
 - What STEM skills might be needed to develop this technology?
 - How might science and technology developments impact the future?

The first computer: Australia's first computer (the CSIRAC) was created 70 years ago. It was the size of a double garage and could perform one operation per second. Today's smartphones have over 7,000,000 times its processing power, yet 1/10,000th its mass.

Option 3: Future innovators

Duration: 40-60 minutes

Task: Watch the STEM in Schools video broadcast on 30 October 2019 (duration approximately 12 minutes). Students then collaborate to create their own innovation to help solve the global challenges of the future.

Materials:

- Butchers paper, white board or devices (e.g. laptop, tablets)
- Markers/pens/pencils
- Miscellaneous materials for lo-fi prototyping, such as a maker cart or cardboard, tape or paddle pop sticks (optional)

Student activity:

Choose a prompt for students to work towards with their innovation to help solve the global challenges of the future. Possible ideas include:

- Create something to help the scientists in the video broadcast with their work
- Create something relating to a topic you have been focusing on in class
- Connect one of the global challenges to your student's local context, for example:
 - If in a farming community, explore food security and quality and come up with an idea to help sustainable farming
 - If in a coastal region, explore the marine environment, and come up with an idea to help maintain biodiversity
 - If in an urban setting, explore future industries and come up with an idea for sustainable energy or to help manage a growing population.

Step 1: Ideate (5 minutes)

- Individually, students brainstorm four ideas to come up with a few ideas for an innovation based on the prompt above

Ideation tips and tricks:

Ask students to divide their paper into quarters and fill each with a drawing to represent four ideas (don't write words)

Use an online countdown timer on a projector to help keep brainstorming to a time limit and try and get students to come up with four ideas in the time allocated

Emphasise quantity over quality

Encourage out-of-the-box thinking and ideas – the wackier the better!

Step 2: Collaborate (5 minutes)

- Students share their four ideas with a partner/small group and pick one idea to progress. Idea mash-ups, where students combine their ideas into a mega innovation are a great way to encourage collaboration.

Step 3: Prototype (20-30 minutes)

- Students work in their groups to create a lo-fi prototype of their innovation. This may be a physical prototype — that uses everyday materials to represent their ideas — or a detailed drawing that highlights key features.

Step 4: Feedback (5-10 minutes)

- Students share their ideas with other groups/the class and provide feedback on each other's innovations. "I like... I wish... I wonder..." are useful prompts for providing positive and productive feedback.

Step 5: Reflection (5 minutes)

- On the activity: ask students to reflect on the process, the challenges they faced and how they overcame them
- On the global challenges more broadly: Ask students to reflect on the role of STEM professionals in solving these challenges, and what students might be able to do to contribute to a positive future for Australia.

School-aged innovators: Check out some of the innovative ideas and prototypes from the BHP Foundation Science and Engineering Awards:

<http://www.scienceawards.org.au/Student-Awards>

Appendix 2 Global challenges

CSIRO's purpose as Australia's national science agency is to solve Australia's greatest challenges through innovative science and technology – it's what we've been doing for the past 100 years.

As one of the world's largest mission-driven multidisciplinary science and research organisations, we are focusing on the issues that matter the most: for our quality of life, for the economy and for our environment.

When we all focus on the big things that really matter, Australian science and technology can solve seemingly impossible problems, and create new value for all Australians.

As part of our work, we have identified six global challenges that will have a major impact on Australia over the next 20 years. The challenges were identified through analysis of our own trend modelling and forecasting, including the Australian National Outlook report, engagement with our partners in industry, government and academia, and a review of Australian and international priorities (including the Australian Science and Research Priorities and the United Nations' Sustainable Development Goals). We won't solve these alone, we collaborate with universities, governments and Australian and international industry to unlock a better future for everyone.

These challenges will help you and your students theme your podcast and learn more about STEM careers for STEM in Schools. We recommend that you theme your podcast on at least one or two of these six challenges in line with the experience and work of your guest/s or classroom focus.

The six global challenges

Resilient and Valuable Environments Enhancing the resilience, sustainable use and value of our environments, including by mitigating and adapting the impacts of climate and global change.	Future Industries Help create Australia's future industries and jobs by collaborating to boost innovation performance and STEM skills.
Food security and quality Achieve sustainable regional food security and grow Australia's share of premium Agri-food markets.	Sustainable Energy and Resources Build regional energy and resource security and our competitiveness while lowering emissions.
Health and Wellbeing Help enhance health for all through preventative, personalised, biomedical and digital health services.	A secure Australia and region Help safeguard Australia from risks (war, terrorism, regional instability, pandemics, biosecurity, disasters and cyber-attacks).

Appendix 3 Media and social media

Social media

Keep your eye on the social media hashtag **#STEMinSchools** throughout the day to take a look at what other schools, STEM professionals and parliamentarians are sharing.

We strongly encourage you to share what your school is up to, and what your students have learnt during STEM in Schools on social media. Below are some thought-starters to get you going on the day. Use the official hashtag #STEMinSchools to ensure your school's activities are shared with the nation.

Here are some thought starters for your social media posts:

- Share what your students learnt in their classroom activity
- Share what your students learnt from the STEM professionals
- Share what your students learnt about Australia's global challenges

Media

Should your school be interested in inviting local media to your event, we have provided a media release template below. Please amend details as appropriate to your school's event.

Should you receive any media enquiries about the broader STEM in Schools event or CSIRO activities outside STEM in Schools, you can refer the media outlet to:

CSIRO media: Phone: 1300 555 005 | Alternate phone: +61 8 8303 8857 | Email: media@csiro.au

School media release template

Wednesday 30 October 2019

[insert school] welcomes special guests into the classroom for STEM in Schools

Students at [insert school] will be joining more than 300 schools across Australia in welcoming parliamentarians and science, technology, engineering and mathematics (STEM) professionals into their classroom today as part of the national STEM in Schools event.

STEM in Schools is being facilitated by Australia's national science agency, CSIRO, and aims to make STEM careers more visible and relatable by inviting STEM professionals into the classroom to share their work and their stories with students. STEM professionals from across CSIRO and the Bureau of Meteorology are taking part, and will explore the important role that scientists have in addressing global challenges.

[insert quote, if applicable]

As the nature of work changes and will continue to change in the future, it is more important than ever that students participate in and engage with STEM subjects in Australia, and that STEM professionals unite to engage students.

[insert quote, if applicable]

[insert parliamentarian name, if applicable] will join the students in the activities, reinforcing the national importance of STEM for Australia's future. The conversation will continue online, with all Australian STEM professionals encouraged to share their own STEM career stories using #STEMinSchools on Twitter, Facebook and Instagram on the day.

Details of event

Date: Wednesday, 30 October 2019

Time: 11.30am

Location: *[insert school name]*

Media contact: For more information about the event, please contact: *[insert media contact]*
