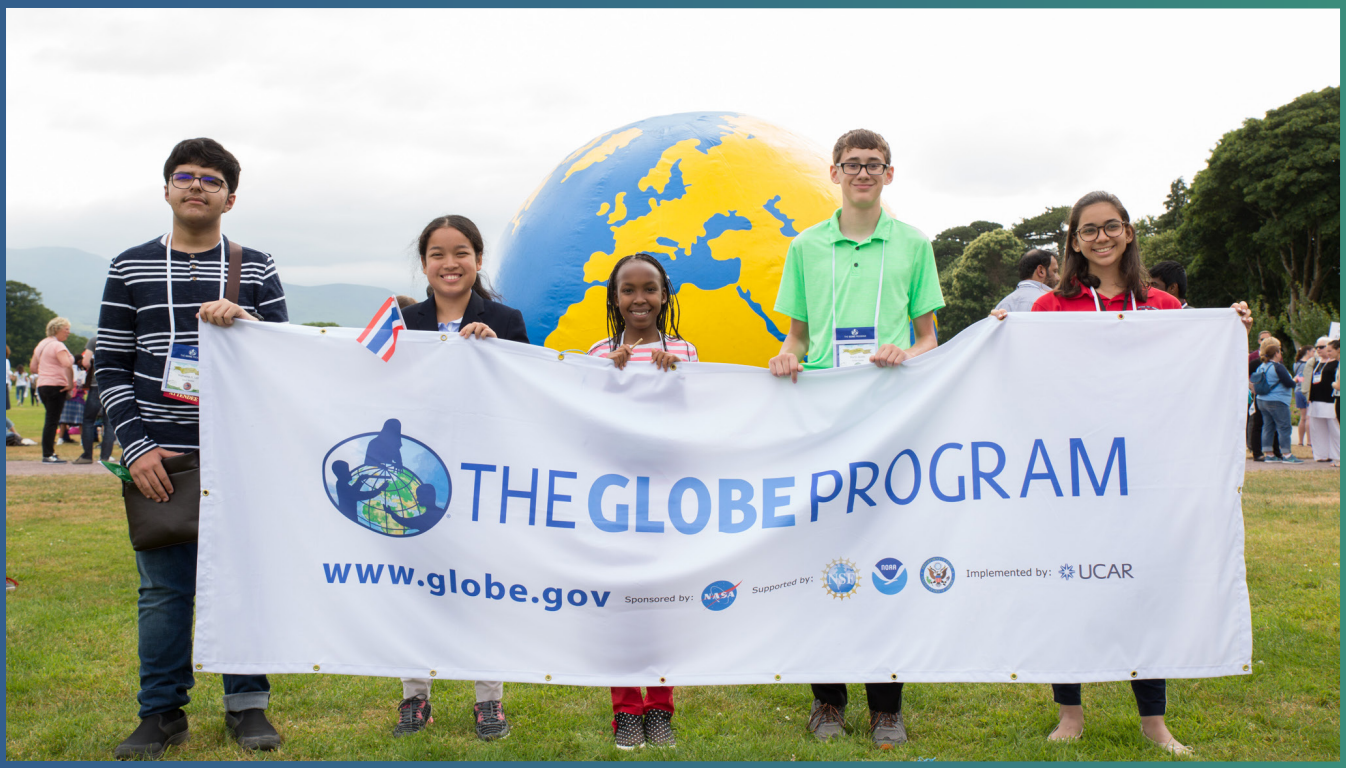
This toolkit was developed by the Bureau of Educational and Cultural Affairs Collaboratory to support virtual exchange programming for members of the Global Learning and Observations to Benefit the Environment (GLOBE) Program

GLOBE virtual exchange toolkit

The Collaboratory | Bureau of Educational and Cultural Affairs
U.S. Department of State

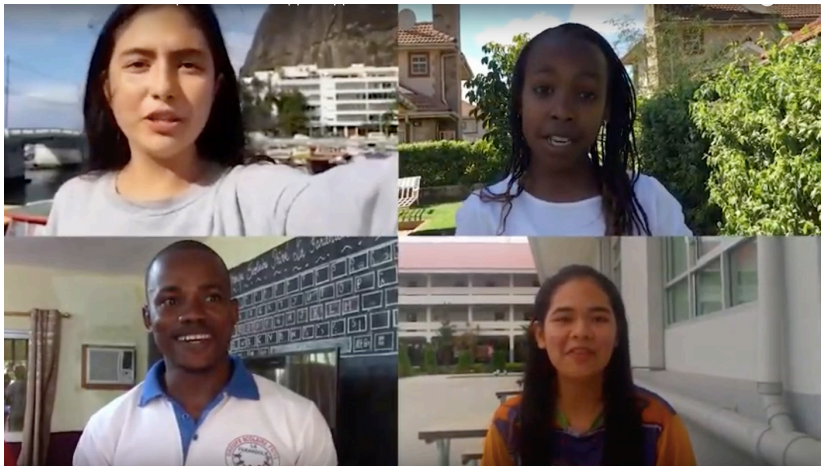


Collaboratory THE GLOBE PROGRAM

Do you want your students to engage with their counterparts on GLOBE activities to enhance STEM education and science communication skills?

Do you want to connect with citizen scientists around the world, using technology as a tool for educational and cross-cultural experiences?

Virtual exchanges create opportunities for mutual learning, whether participants are meeting for the first time online or sustaining relationships made in-person. This toolkit provides guidelines, principles, and technical guidance to help you design and implement a virtual exchange with other GLOBE participants.



the GLOBE program — promoting science and environmental literacy

The Global Learning and Observations to Benefit the Environment (GLOBE) Program is an international science and education program that provides students and the public worldwide with opportunities to participate in data collection and the scientific process, and contribute meaningfully to our understanding of the Earth system and global environment. Announced by the U.S. Government on Earth Day in 1994, GLOBE launched its worldwide implementation in 1995.

the ECA Collaboratory — innovative virtual exchange leaders

The Collaboratory is the innovation lab of the Bureau of Educational and Cultural Affairs (ECA) in the U.S. Department of State. The Collaboratory mission is to design, pilot, and share new approaches to educational and cultural diplomacy. Since its creation in 2013, the Collaboratory has developed new practices and incorporated new technologies to promote virtual exchange as a tool to complement or extend the Department's educational and cultural exchanges.

In 2018, the Collaboratory teamed up with the Bureau for Oceans and International Environmental and Scientific Affairs (OES) and the GLOBE Program to design the first pilot GLOBE Virtual Exchange. This toolkit draws from lessons learned in that pilot program.

what is a virtual exchange?

A virtual exchange should be personal, immersive, and intensive to make an impact, with the goal of transforming participants' ideas into actions. A one-time web-chat or a one-sided use of technology (web meeting, tour, town hall, etc.) is a virtual program, but does not meet the definition of virtual exchange due to the lack of sustained engagement and mutual transformation. A virtual exchange has an arc of engagement with a beginning, middle, and end that is built and centered on the participants and project goals. Virtual exchange should use a mix of synchronous (live, e.g. Zoom, Google Hangouts) and asynchronous (time-delayed, e.g. recorded, social media posts, or email) technologies that allow participants to interact and exchange beyond surface level connections.

what do virtual exchanges look like?

Virtual exchanges come in many shapes and sizes depending on your goals, audience, technical capacity, and subject matter. The program formats and technology platforms can range from informal discussions via Google Hangout, to more complex and formal online presentations and Q&A sessions between a virtual speaker and a large audience and breakout rooms via, for example, Zoom. Other live real-time platforms include Adobe Connect, YouTube, Facebook Live, Skype, Google Hangouts, and UberConference. Virtual exchange activities do not have to be live-streamed. Many teachers use email, text chats on social media, and even phone calls to supplement live streaming, or to bridge large differences in time zones. There are a variety of asynchronous platforms available for use on virtual exchange programs; including SnapChat, WhatsApp, Facebook, etc. You do not have to have high internet bandwidth to build a virtual exchange. The important thing is to tailor the exchange to the participants, rather than attempting to tailor the participants to the technology.

ECA's Collaboratory encourages using seven (7) criteria when creating a virtual exchange:

1. Have objectives for all planned virtual interactions and the program overall;
2. Focus on a specific objective during individual connections;
3. Include multiple interactions over a sustained period of time;
4. Plan out your facilitation plan for each point of connection to guide conversation and ensure deep engagement for all participants;
5. Incorporate a mix of synchronous and asynchronous connections that allow for students to interact beyond the surface-level;
6. Take time for students to get to know each other personally, but go deeper than the "foods, flags, and festivals" level of exchange;
7. Integrate a variety of evaluation tools and methods to ensure students reach program goals, learning outcomes, and outputs.

How can you use virtual exchange with GLOBE?

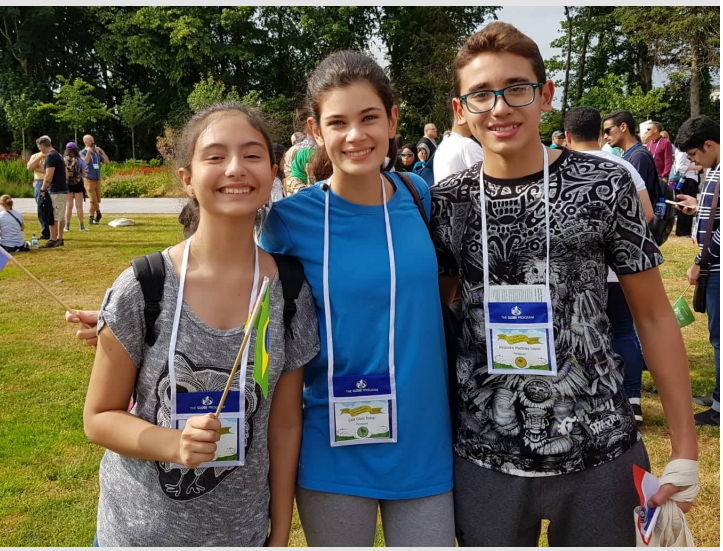
The 2018 **GLOBE** Virtual Exchange pilot connected students at schools in Brazil, Kenya, Paraguay and Thailand, all of whom were participating in the **GLOBE** Zika Education and Prevention Project. Students collected water samples and tracked mosquito habitats.

Over three months, students shared photos, videos, and stories over a closed Facebook page and connected live for six one-hour-long sessions during which they learned about mosquito-borne diseases and science communication. They worked together to produce films and other tools to communicate with their communities about public health. A few members of each school group also met in person at the **GLOBE Learning Expedition** in Killarney, Ireland.

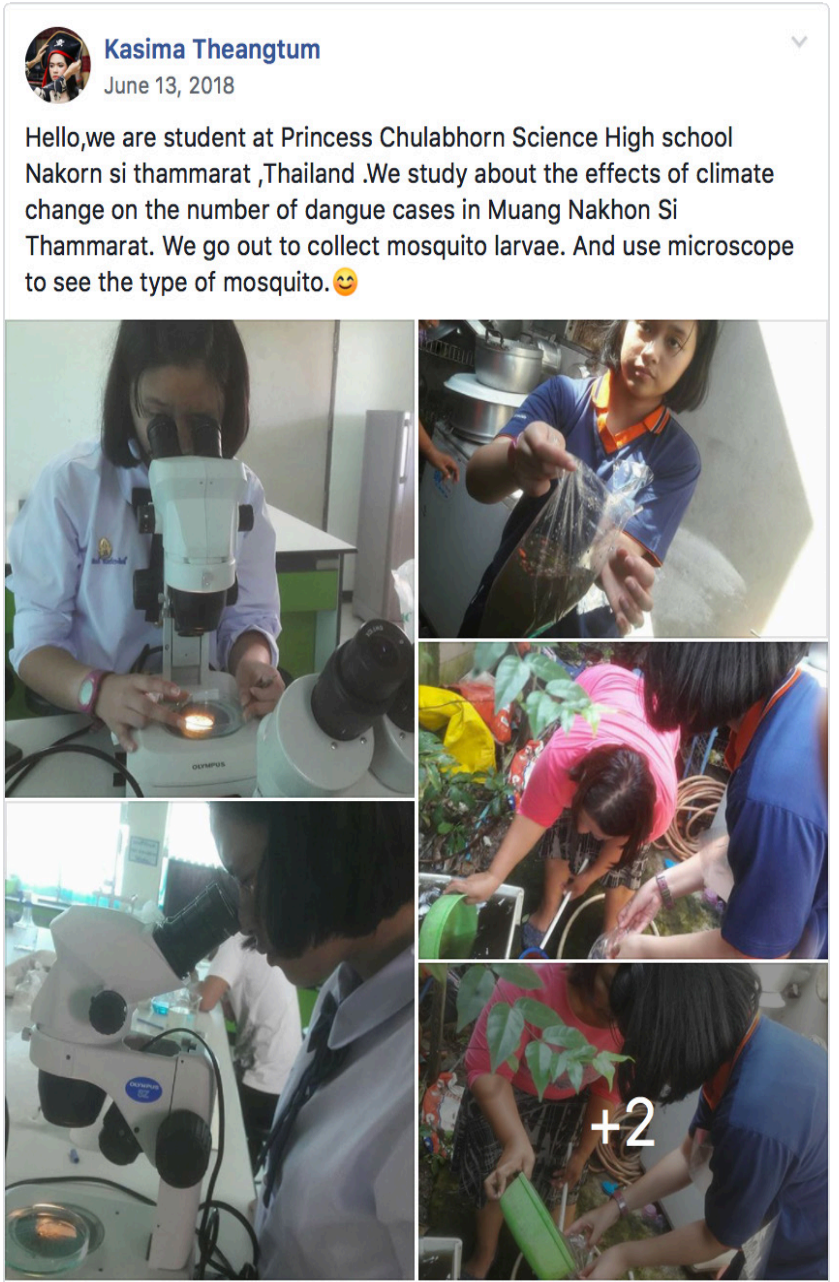
Some live sessions included guest presentations from museum designers and filmmakers, but most of the sessions involved the students sharing their experiences, answering a question, or providing feedback to each other.

Right: A post on the **GLOBE** pilot virtual exchange Facebook page.

Below: Students from Brazil and Paraguay meet in person at the **GLE** in Ireland.



GLOBE ZIKA EDUCATION AND PREVENTION



what kinds of activities can we do in a virtual exchange?

If you have never done a virtual exchange before, you might want to start with a three-lesson arc. With this method, you host three synchronous sessions supported by a series of asynchronous connections in between. Evaluate what worked and what did not, and then build from there. You will be coordinating closely with the teacher on the other side of the exchange. You will want to discuss teaching philosophies and styles as you begin to work together. Note that participant attention spans may be shorter for a virtual engagement than in an in-person setting. Plan for interactions that are about 45 minutes long. Discuss if you will need to allocate time for translation or interpretation.

The virtual exchange will have a more lasting impact if it goes beyond talk to action. We recommend that you design your exchange so that participants create and execute a joint project together that each group will carry out separately. In comparing the process and the results, participants will have some of their richest conversations.

You may also want to have some sort of culminating event, whether it is a guest speaker, an awards ceremony, a performance, or something else. On the right is a sample timeline of a virtual exchange program.

SAMPLE ACTIVITIES:

Share pictures of yourself using GLOBE. Images can depict collecting data, your local environment, your school and community. Have students from another school take those pictures and use them to create a narrative story where they interpret your photos.

Work together to create presentations about your **GLOBE** work. This can focus on describing how you collect data, how this work affects your community, what your local environment is like, or whatever you want. Students can watch or view presentations beforehand and then offer feedback or ask questions during a live session.

Introduce a guest scientist or other expert! Have a professional scientist talk to your students about their expertise and career. The **GLOBE International STEM Network** includes scientists who have volunteered to work with **GLOBE** participants. Other organizations like Skype-a-Scientist also connect working scientists with classrooms for virtual connections.

sample program timeline:

2-4 months before start

- **Find your own partner school or use the GLOBE website.**

1 month before start

- **Teachers connect for planning and practice on virtual platforms.**
- **Create a Facebook, Tumblr, or Instagram page for sharing photos and text asynchronously.**

beginning the virtual exchange

- **Participants send 5-minute introduction audio or video to each other. Show off your community and environment.**
- **Upload pictures or videos of your field site! Show us how you collect GLOBE data.**

month 1 of the virtual exchange

- **Kickoff event! First real-time sessions with students.**
- **Students ask each other questions about uploaded photos and videos.**
- **Students start to plan together for a project.**

months 2-3

- **Real-time sessions continue every other week, with asynchronous posts in between.**
- **Guest speaker live session. Online chat with a scientist or other guest.**

month 3 or later

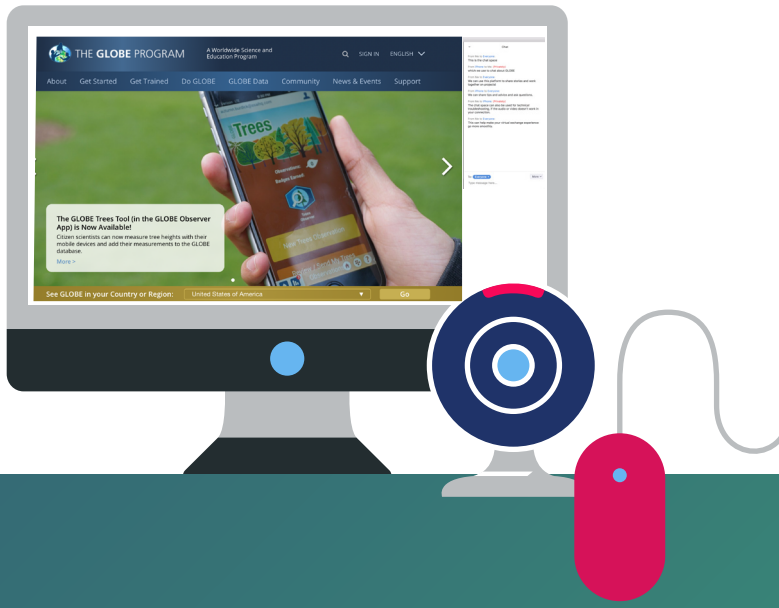
- **Final project presentations!**
- **Share your experience with the GLOBE community.**

best practices and take aways

- Coordinate schedules and establish regular times to connect. Academic semesters and school holidays vary by country and by individual schools. Before starting a series of live connections, try to agree to mutually available times. Be sure to take into account exams or other commitments. Be transparent and realistic about your availability.
- Center the virtual exchange on a project-based model. What can you do together to enhance your use and experience with **GLOBE**? (See suggestions at right)
- Understand the technology and platforms you want to use for the needs of the participants and program. Does your school have stable internet access? Does your school or government restrict access to certain social media sites that you might use for sharing photos or other materials?
- Build in lead-time to train on any technology, practice and test virtual connections, and coordinate with one another.
- Share what you're doing with the rest of your school and your community. Virtual exchange is also a great way to make others aware of your work with **GLOBE**.
- Blending in-person elements with a virtual exchange can greatly enhance the experience for participants. Do not be afraid to bring in speakers, conduct a museum tour virtually, or experiment with other in-person elements.

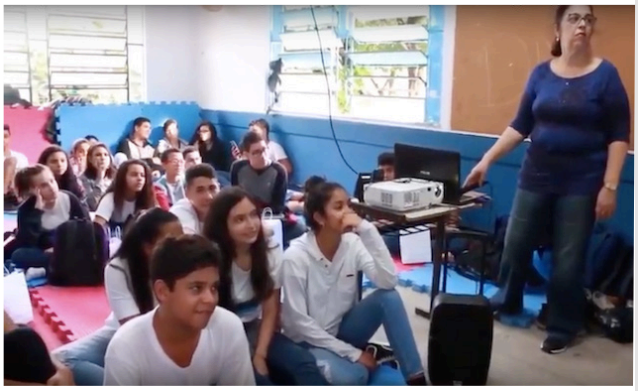
joint projects using GLOBE

- Work together on a joint submission to the GLOBE International Virtual Science Symposium.
- Share your stories with the **GLOBE** community via a **GLOBE Star**.
- Create comics, videos, or other creative projects about your research. Students can work together to create storyboards and collaborate on different panels or sections of a shared comic or graphic arts project. This can work especially well where students don't share a primary language, as text in a variety of languages can often be added to the visual medium later.
- Create museum-style displays to share with other schools or your local community. Virtual exchange partners can discuss their strategies for outreach and the local environmental issues their community faces. Why does **GLOBE** matter in your country or town?



technical tips

If you have designed an exchange that will use two-way video, make sure you test your connection before starting the exchange. The ideal time to test would be one week before at the time of the exchange, since it will most closely match what you can expect on the big day. Always have a backup plan, even if it is just a phone at the ready. Also, make sure you have a strong hard Internet connection, ideally via Ethernet rather than Wi-Fi for more stability. Also, make sure that the microphone is only on for the person who is currently speaking. All other microphones for participants should be muted. This step will eliminate feedback and greatly increase sound quality.



Above: Students from Brazil connecting in a real-time session

technical troubleshooting cheat sheet

Virtual exchange programs are a challenging blend of audio, video, internet, and technology troubleshooting. Two "rules of thumb" you may find helpful are eliminating variables, and working your way backwards from the problem.

Sharing your screen with your exchange partner might be the easiest way to troubleshoot technical problems together. If you are using a platform, like Zoom, that allows screen sharing, consider working together to troubleshoot collaboratively.

Eliminating Variables requires looking at all of the possible factors that could influence your problem and testing each one. By eliminating all of the variables that are not influencing your problem, you also simplify the set of solutions available.

Working your way backwards from the problem involves reviewing the cause and effect chain. That is, returning to each step along your process of connecting cables, turning switches on, accessing internet, and running your program. Only you can know the particular process and variables at play with your program, but we have a list of general questions and tips to help you.

general troubleshooting checklist and questions

Troubleshooting for Computer & Internet Access

- Is everything turned on? Check every piece of equipment.
- Are the equipment and computer charged and/or plugged in?
- Are all of the cables connected and plugged in tightly? Follow each cord.
- Have you tried connecting from another computer?
- Are you connected to the internet?
- Are you accessing the correct URL/website link?
- Have you tried using a different web browser? Chrome, Safari, and Firefox, may work differently for you, depending on the platform you use.
- Have you tried refreshing the web page?
- Have you disabled your browser pop-up blocker for the particular website or application?
- Is there a system firewall blocking your website?
  - Be mindful that some governments, locations, and/or organizations restrict access to certain websites and social media platforms, testing early and often can avoid headache and embarrassment later.
- Have you cleared the browser's cache?
- Do you have the latest version of Adobe Flash, Java, etc.?
- Have you downloaded and installed all necessary software or application plug-ins?
- Are you using the most updated version of your browser?
- Have you closed all other programs, applications, or processes running in the background that may slow your connection or your computer?
- Do you have any other programs running that use your webcam and mic and might interfere, such as Skype?

Troubleshooting for Audio and Video

- Is an audio or video problem being experienced by all users, or only one particular user?
- If a particular user or counterpart is having difficulty with the audio, ask:
  - If the participant's speakers are unmuted, turned on, and turned up,
  - If the participant has another program operating that could steal audio,
  - If the participant can check the system preference settings AND those of the online platform being used.
  - Does the platform require you to select a mic/camera? Has the correct mic/camera selected?
- Are the speakers turned on and volume up?
- If your device connection or sound keeps dropping out, then you may have a bad cable. Try replacing it with a different cable if one is available.
- If your microphone requires batteries, are they new? Try changing or recharging them.
- Is the microphone too far from the audio source?
- Is the microphone too close to the audio source?
- Do you need external speakers to amplify audio?
- Are all mobile phones in the vicinity turned off?
- Is there a piece of clothing or jewelry interfering with the audio source/microphone?
- If you have a USB microphone plugged into your computer, did you try restarting the computer?
- Is the USB microphone selected as your input in the virtual web-chat room settings and computer system preferences?
- Is your webcam or video camera turned on, and are all of the cords securely plugged in?
- Is your camera recognized on the computer AND within the virtual web-chat platform?
- Have you tried adjusting your video quality by right clicking the video player and picking a lower resolution?
- Close all other browser tabs, websites, and video/audio players to ensure a faster speed.

remember

1. **Even if you have tested the connection previously, always allow ample time for testing and setup beforehand. Be ready at least an hour before the live event.**

2. **Always test the microphones before you begin ("Testing, check 1, 2, 3..." or "Boots and cats").**

3. **Relax. Even if there are a few technical bumps, and there will be, the participants will remember the exchange itself rather than what happened with the microphone.**

connect

with your Country Coordinator or U.S. Partner

Let them know about your virtual exchange experience. They may be able to help you find partners or suggest activities! Sharing your experiences can help other schools start their own virtual exchanges and grow the GLOBE community.