

How to Use TILclimate Educator Guides

About ESI & TILclimate

Founded in 2014, the Environmental Solutions Initiative (ESI) at the Massachusetts Institute of Technology (MIT) is an institute-wide effort to mobilize the substantial scientific, engineering, policy, and design capacity of the MIT community to contribute to addressing climate change and other environmental challenges of global import.

TILclimate (Today I Learned: Climate) is ESI's award-winning podcast that breaks down the science, technologies, and policies behind climate change, how it's impacting us, and what we can do about it. Each quick episode gives you the what, why, and how on climate change — from real scientists and experts — to help us make informed decisions for our future.

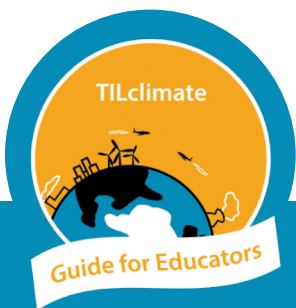
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About the Educator Guides: Flexible, Adaptable, Relevant

The TILclimate Educator Guides are not meant to be a curriculum. Instead, they are a collection of connected activities, discussions, and investigations meant to be a buffet for educators. Each Guide includes two to four activities, which may be done in sequence, as a standalone, or as a jigsaw with groups sharing their results from different activities. Some activities are hands-on in the classroom, where others are usable in asynchronous or remote situations. Explanations of the individual activities are included with each Guide. Wrap-up questions are included, which can be used as an in-class discussion or as part of an assessment.

In almost all cases, the Guides are linked to an episode of the TILclimate podcast. These episodes are short (under 15 minutes long) and aimed at a general audience - no jargon, no complex science background. They are apolitical, science-based, and appropriate for audiences from middle school and up. Whether students listen to the podcast at home as homework, in the classroom, or read the transcripts that are included with every episode, you can be assured that they are getting a solid introduction to the topic at hand.



How to Use TILclimate Educator Guides

Who are These Activities For?

Climate change touches all aspects of human life. We know that teachers across disciplines, grades, and locations are teaching climate in their classrooms, and are looking for resources to do so. These Educator Guides are designed with high school teachers in mind, but with the knowledge that middle school and college educators may be able to adapt them for their students. Out-of-school-time educators may also find parts of these activities applicable with their youth. Within high school, the Guides are not tied to a specific course or grade band.

Each Guide includes specific adaptation ideas, and all Guides are shared under a Creative Commons License that allows remixing, adapting, and sharing. Teachers often say that they get their best resources from fellow teachers. If you use one of these Guides and like it, whether you adapt and remix or not, please share within your networks! Our resources are free, adaptable, and we encourage the community of teachers to support each other with solid, science-based climate information.

Included in Each Guide:

Each Educator Guide is linked to an episode of the award-winning podcast, TILclimate (Today I Learned: Climate.) In addition to pre-made student worksheets, readings, and instructions, each Guide includes:

- Detailed explanation of each activity
- Materials and prep for hands-on activities
- Approximate time commitment for each activity
- NGSS and Common Core standards alignment
- Adaptation ideas for Physical Science, Life/Environmental Science, English Language Arts, and History/Social Science.
- Recommended MIT background resources
- Wrap-up discussion questions



Background Climate Information

Looking for more background information for yourself or your students? MIT's Environmental Solutions Initiative (ESI) has a host of resources at your fingertips.

MIT Climate Primer

The Climate Primer "Climate Science, Risk & Solutions: Climate Knowledge for Everyone" by Dr. Kerry Emanuel (<https://climateprimer.mit.edu/>) includes eleven interactive segments, covering everything from a brief history of climate science to climate models, observed risks, and solutions. This primer is aimed at a general audience, making it appropriate for your own professional development as well as for students. While pieces of the primer build on one another, they can also be successfully assigned separately if students already have a basic foundation in climate science.

Ways to Use the Primer:

- For your own professional development and better understanding of climate science
- As a reading assignment for students
- As a research resource for student projects
- As an exemplar for students thinking about how information is presented

MIT Climate Explainers

The MIT Climate Portal is also host to a series of Explainers, written by scientists and experts in climate-related fields. Each explainer is a short, usually one-page, essay about a specific topic, such as Sea Level Rise, Concrete, or Food Systems and Agriculture. The explainer collection continues to grow, and all explainers can be found at <https://climate.mit.edu/explainers>. Specific explainers will be listed with each Guide, as applicable.

Ways to Use Explainers:

- For your own professional development and better understanding of climate science
- As a reading assignment for science students
- As a non-fiction text for English Language Arts Common Core standards
- As a research resource for student projects
- As an exemplar for students writing their own short summations of science topics

Ask MIT Climate

Not finding the answers to your questions, or those of your students? Explore Ask MIT Climate! Whether it's simple or sticky, about science or solutions, ask us! We work with MIT faculty and scientists to give you clear, no-nonsense answers grounded in the best scientific information. New answers are posted every month and there are dozens of questions already answered. <https://climate.mit.edu/ask-mit-climate>

Using Podcasts in the Classroom

You and/or your students may already listen to podcasts. Maybe you listen to political analysis while you fold laundry, or to your favorite true crime stories while running errands. If you do, you have already experienced some of the benefits of podcasts for learning. You can listen anytime and anywhere, often while doing something else. You can pause, rewind, repeat, stop and look something up. There is an immediacy and humanity from listening to someone's voice. Podcasts can be conversational, story-driven, and immersive.

There are three main categories that describe the use of podcasts in school: Substitutional, Supplemental, and Creative.

1. Substitutional podcasts can be used in a 'flipped classroom' model in place of a lecture in class. Students listen at home, and class time is used for practice, experimentation, project work, or discussion.

As an introduction to a course, teachers made a conversational podcast that addressed some common misconceptions about the overall course topic. All students listened before the first day of class, and it helped establish shared language and understanding from Day 1.

2. Supplemental podcasts introduce a topic, giving students a real-world grounding, shared language, and addressing preconceptions.

When a teacher knew she would be giving a lecture on a complex subject, she assigned a related podcast ahead of time that covered some of the basic information. Her students were more prepared to think about the thornier parts of the lecture.

3. Creative podcasts are made by students, either in place of a traditional written assessment or as part of a larger project.

Seniors in AP Biology made podcasts for the freshman in Intro Biology, explaining their favorite topics. The incoming freshmen the next year appreciated learning from peers, and the teacher used the senior podcasts as a year-end assessment.

National Public Radio (NPR) has a great guide for student-created podcasts. <https://www.npr.org/2018/11/15/662070097/starting-your-podcast-a-guide-for-students>

Using Podcasts in the Classroom

We understand that device and internet access are not universal for students, nor are podcasts the preferred learning mode for all. Some ideas from other teachers include:

Listen in class but make it an Experience.

A high school science teacher in Massachusetts dimmed the lights somewhat and gave students an optional graphic organizer while they all listened together. Students had the option to flip the page over and simply doodle while they listened, if the graphic organizer was not their best way of integrating what they were hearing.

Break the listening into chunks.

TILclimate podcast episodes are short, but it may benefit students to listen in smaller 3- to 4-minute chunks and discuss each segment before moving on.

Read the transcripts.

There are full written transcripts for every episode of TILclimate. Not only do these transcripts make the podcast accessible to deaf or hard of hearing students, but many people also find that they get more out of listening if they are reading the same words as they hear them. English Language Learners may also benefit from having written words alongside the audio.

Bring in visuals.

A short slideshow of photos, paintings, or other visuals associated with the topic of the podcast may help some students stay focused. Alternatively, having students find images to go with the episode could be used as an assessment of understanding.

Here at MIT, we're making it easier for you to teach climate change, earth science, and energy topics in the classroom with TILclimate (Today I Learned: Climate) podcast episodes and guides. Whether used as a substitution for a lecture or as a supplemental introduction to a unit, these short science-driven episodes deepen student understanding of the multiple interlocking aspects of climate change.

Throughout these Educator Guides, we invite students to think about how they would share their learning with family and friends. Student-created podcasts are shareable, creative, and have multiple options for embedded assessment. If you or your students do create podcasts to answer some of these big questions, we would love to hear them! Email us at tilclimate@mit.edu, Tweet us @tilclimate, or tag us on Facebook @climateMIT.

Talking Climate Change in the Classroom

Let's face it: talking about climate change can be scary. For many of us, thinking about the stark realities of a climate changed future can cause feelings of anxiety and hopelessness. For students or teachers who have already experienced climate-related events, these topics can be overwhelming. Students whose families have lost homes, livelihoods, or family members to major storms may not be able to talk about increased hurricane intensity as a purely theoretical matter. By approaching climate change from a trauma-informed and trauma-sensitive angle, students can feel supported and empowered.

Admit That It May Be Scary or Sad

We are often loath to talk about feelings and emotions in school. However, a simple acknowledgement that the topic to be discussed might be scary or emotional can go a long way to relieving students' worries. Make sure students know what resources are available to them (school guidance or counselors, permission to step out of the room, etc.) should they find themselves overwhelmed by what they are learning.

Start Off At A Remove

If using flood maps, storm maps, or other location-based data, consider beginning with a map that does not depict the students' homes. While it may be tempting to make the learning relevant by focusing on a familiar area, students may find themselves distracted from theoretical work by worries about their own neighborhood. Similarly, if students have friends or family in a place that was hit by a large storm, be cautious in using images from that storm. Later on in a unit, students may be invited to look at a map that includes their own home.

Invite Memories

This may seem counterintuitive, but for certain topics you may want to give space for students to share their memories of a climate-related event. If your community recently experienced a flood, storm, wildfire, or major heat wave, your students may really want to share pictures and stories. Students may be able to collect data in the form of interviews, photos, and news reports. Be aware, however, that some students may not be ready to bring their stories to school, or there may be students whose experience was significantly different to others.

Talking Climate Change in the Classroom

Focus on Solutions

While learning standards focus on climate impacts, solutions are just as important if not more so. For the social-emotional needs of students, solutions are key. Find stories of groups of people who have solved a related issue. Encourage your students to research innovative, community-oriented solutions. It is vital that the solution be clearly related to the impact that you are studying. Not all 'environmentally-friendly' actions are directly connected to climate change. Climate solutions often fall into one of four categories:

- **Energy Shift** - technologies, policies, and practices that move away from carbon emissions from fossil fuels and towards carbon-neutral or carbon-negative energy sources.
- **Energy Efficiency** - technologies, policies, and practices that reduce communities' need for electricity or other forms of energy.
- **Communication** - for all the reasons discussed above and more, climate change is not a common topic of conversation for most Americans. The more we talk about it, the more solutions and policies will be developed and deployed.
- **Adaptation** - even if we ceased all carbon production tomorrow, some climate impacts will continue and grow for years. Solutions are needed for adapting our cities, buildings, and lives to rising sea levels, storms, and heat.

This guide is not intended to be all-encompassing. Your school or institution may benefit from a larger training on trauma-informed education. An awareness that climate change may be a difficult topic for students is not meant to discourage teaching it - quite the opposite! By approaching Big Ideas with care for the social-emotional learning of students, educators can create long-lasting educational outcomes.

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