

What does STEM integration look like?



STEM activities integrate Science, Technology, Engineering, and Math into lessons in order to teach students 21st century skills through problem solving. Let's look at some of these components and how they provide opportunities to make your lessons more engaging and powerful for student learning.

The Art of Technology

STEM lessons often incorporate technology to solve problems to real world problems. This isn't just about having students use a computer to build a presentation, this is about knowing how to use technology to make problem solving more efficient.

Think about a lesson you taught recently. Did students ask why you they couldn't use the computer to get the answer? Students use technology on a daily basis. Even our littlest students do. When they ask about using technology, the answer can no longer be... "you need to know how to do this on your own." We also need to consider showing students how to efficiently and effectively use the technology they have available to help them problem solve. I'm not saying we should always use technology.

I am saying we should allow for technology to be an extension of ideas we teach in order to prepare our students for the future.

Here is an example of incorporating technology into a typical language arts unit on poetry: Students are studying stanza, voice, and rhyme in a varying set of poems. Once students understand the concept, the teacher asks students to prepare a poem to share with the class. To better incorporate technology, the teacher allows students access to recording software. Students will have the opportunity to create an audio file, or a video file. For the audio file, students have to put their poem to music (created or found) and then adjust the tempo of the poem to match the tone that they want their poem to convey. For the video file, students will perform their poem using visual props, such as costumes, objects, and posters that enhance the message that is presented in the words of their poem. After students have presented their completed poem files, the class will have a conversation about the difference in the visual poems and the audio poems. Which ones conveyed the message better; what were the limitations of each technology; and how easy is it to identify the stanza, voice, and rhyme in the different settings.

Engineering in Action

The Engineering Design process is very straight forward. Students are given the opportunity to build something, then improve on their creation until it is a workable solution to a problem.

There are a variety of ways that students can “build” during a lesson.

- This building process could be very low-tech. For example, students may be building a water wheel using materials found in a classroom.
- The building process could be virtual. For example, students may be asked to build a garden using Google Sketchup.
- The building process could be a kit that is purchased. For example, students may be using a robotics kit that requires building and coding.
- The building process may be a mixture of all of the ideas above!

Engineering does take some forethought and planning before you can use it to extend a lesson. You will need to consider the materials you need in order for students to build. Sometimes you can ask community partners to donate materials needed, or even join you in the classroom to help students during the building process. You will also have to consider how many revisions it will take students in order to build a workable product. If

it is something simple, students may be able to build it once, revise it once, and be ready to present. If it is something that is considerably harder, you will need to plan enough revision time to allow for students to make mistakes and keep trying to come to a better solution.

Tips and Tricks for first time STEM teachers

1. **Don't plan too much the first time!** STEM lessons don't have to be projects that last for weeks. Look at one lesson you can make more interactive with elements of STEM and adapt it. See how it goes! Then add more depth and complexity to future lessons as you and your students are ready.
2. **Build it before your students do.** If you are going to ask students to build something during the lesson, make sure you try it first! This will help you make sure the lessons you teach ahead of time are adequate, that you have the best materials for building, and that you aren't missing any steps that students will need in order to be successful.
3. **Look for prepared STEM activities before creating your own.** There are STEM lessons and camps that are already built for teachers to use. If you have the budget, start with a few of these lessons to see how STEM and 21st century skills are built into a lesson. Then you can extend your own lessons using the instructional strategies you saw in the purchased materials.
4. **If you're going to fail, fail fast. Then improve!** Not everything works out the way you want it to the first time. If it doesn't look like your lesson is going as planned, then make sure students understand what you were trying to teach them, and move on. Then reflect on some things that need to change the next time you STEMify a lesson, and plan for those changes.