

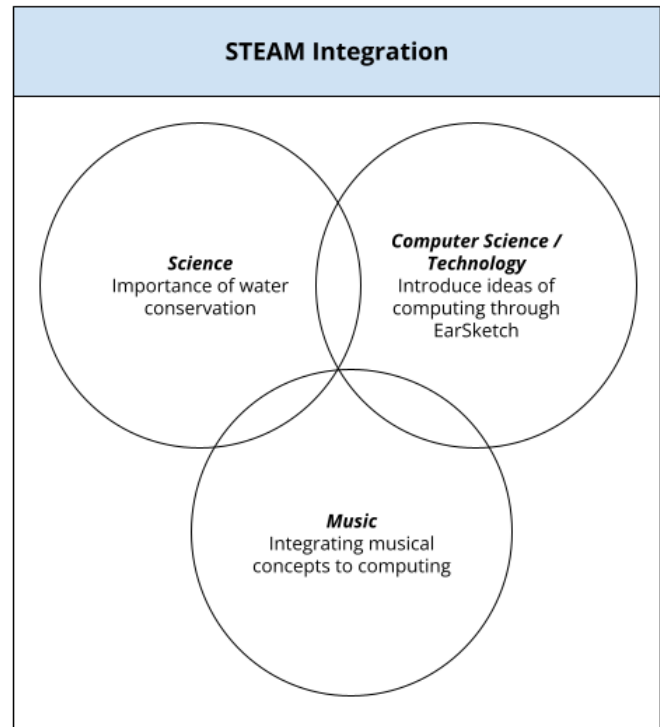
## USE IT, DON'T LOSE IT: CONSERVING THE 1%

### *Lesson Overview*

The driving question for this lesson is “What steps can we take to promote water conservation?” Only 2.5% of all water on Earth is fresh water, and only 1% is accessible for use by people. This lesson, meant to be implemented in parallel with science lessons related to hydrology and water conservation, introduces music and computer programming as ways to impact behavior and promote social change.

In this lesson, students learn basic coding and music concepts by creating a 2-minute song using EarSketch, with vocals that promote the awareness of water conservation. The song can be played as people use water, such as while in the shower, to challenge them to finish their shower before the music stops playing.

This lesson is appropriate for 6<sup>th</sup>-8<sup>th</sup> grade students.



### *Project Description*

This lesson is an integrated STEAM lesson that brings together earth science, computer science and music. The contextual challenge is rooted in hydrology and water conservation and the lesson is meant to be taught in parallel with that science content, but the lesson itself can be used within a computer science, music, integrated STEM, or technology class. It can be implemented as a short, introductory lesson in block computer programming, or can be the context for a deeper dive into more advanced programming concepts using Python or Java Script.

Three different levels of EarSketch programming are included within the lesson. Version #1 is included in the primary lesson plan, Versions #2 and 3 are included as extensions. Each can be done in block programming or using Python or JavaScript.

Programming Options		Project Length
Version 1: Programming Awareness 1	Introduces the EarSketch platform and Digital Audio Workstation. Students begin programming using simple variables and fitMedia blocks, and they learn to upload recorded sounds, and share and debug their songs. They record vocal stems and mix sounds to create a simple 2-minute song using music and vocal stems. They then and share the music by uploading to a playlist.	6-7 hours
Version 2: Programming Awareness 2	Builds upon Version #1 to include adding sound effects to the songs.	8-9 hours
Version 3: Programming Foundations	Builds upon Version #2 to introduce the makeBeat function in EarSketch to enable students to design custom beats using any sound clip and to customize the beat of the music to their own liking. They learn to identify patterns of coding repetition and to create and utilize a for Loop control structure.	10-11 hours

### Learning Goals

Computer Science Learning Goals	Arts Learning Goals
<ul style="list-style-type: none"> <li>To develop introductory programming skills by composing a song using EarSketch by making music in Blocks mode or Script mode using Python or JavaScript coding languages.</li> </ul>	<ul style="list-style-type: none"> <li>To compose and arrange music, compose short pieces, and arrange simple pieces within specified guidelines.</li> <li>To use a variety of traditional and nontraditional sound sources and digital tools when composing and arranging.</li> <li>To listen to, analyze, and describe the music and determine specifics to create desired effects and outcomes.</li> <li>To explore creative ways to achieve mastery of science and musical principles and concepts.</li> </ul>

## Learning Standards

### Aligned Next Generation Science Standards (NGSS)

ESS2.C: The Roles of Water in Earth's Surface Processes: *How do the properties and movements of water shape Earth's surface and affect its systems?*

ESS3.A: Natural Resources: *How do humans depend on Earth's resources?*

ESS3.C: Human Impacts on Earth Systems: *How do humans change the planet?*

### Computer Science Standards (CSTA)

2-DA-07: Represent data using multiple encoding schemes

2-DA-08: Collect data using computational tools and transform the data to make it more useful and reliable

2-AP-11: Create clearly named variables that represent different data types and perform operations on their values

### National Coalition for Core Arts Standards

#### Creating

MU:CR1.1.7a: Improvise (for self and/or others) rhythmic, melodic, and harmonic ideas and variations over harmonic accompaniments

MU:Cr2.1.7b: Use standard and/or iconic notation and/or audio/video recording to document personal simple rhythmic phrases, melodic phrases, and harmonic sequences

#### Responding

MU:Re7.2.6a: Describe how the elements of music and expressive qualities relate to the structure of the pieces

#### Connecting

MU:Cn10.0.7a: Demonstrate how interests, knowledge, and skills relate to personal choices and intent when creating, performing, and responding to music

## Background for Teachers

**Music Background:** Teachers should have a basic knowledge of musical instruments, musical timing (measures and beats) and how mood and emotion are developed using tempo and pitch.

**Technical Background:** Teachers should have a working understanding of the [EarSketch](#) platform and how to create songs using basic computer programming. EarSketch provides [tutorials](#) that are available for users.

## Materials

- Computers, with headphones with volume control
- Access to EarSketch (browser based and free) <https://aws.amazon.com/>

## ENGAGE Making Connections to Real-world Problems

**Section Goal:** Students are introduced to the concept of creating music to propose solutions to a real-world problem.

### Section Activity (Budget 30 minutes):

- Introductory discussion: Start the lesson by facilitating a discussion around real-world problem-solving, particularly around conserving water.
  - What are some problems you encounter in everyday life?
  - What are some ways to address those problems? What are some ways to build awareness of those problems?
  - In thinking about the importance of conserving water, why is it important to be aware of this problem and try to address it? What are some engaging ways to build awareness?
- Facilitate a discussion with the class to enable students to gain an understanding that creating music can help people build awareness of a problem and can help change people's behaviors.

*Script: It is important for people to build awareness around the importance of conserving water. To help build awareness, our class has been asked to create two-minute songs with vocals that emphasize the importance of conserving water. A two-minute song format was selected as a good length for people to play as they use water, such as while in the shower. They can be challenged to finish their shower before the music stops playing.*

*In the next section, students will explore how mood is affected by musical properties.*

## EXPLORE #1: How is Mood Affected by Musical Properties?

**Section Goal:** Students are introduced to how mood and feelings can be impacted through music.

*Note for Teachers:* Students will work in pairs in this unit. Groups of 3 students can also be formed if needed, but pairs are ideal.

### Section Activity (Budget 30 minutes):

Students learn about musical engagement by identifying tempo and pitch related to emotional responses.

- Hand out the [Musical Engagement worksheet](#) and explain to the class that they will be trying to engage their audience in water conservation through music.
- Connect your computer to play sounds for the class but **not the display**. You will play musical introductions from commercials and movie themes without showing students your screen so that they can focus on the sound rather than the visuals. *It will be much smoother if you already have the 3 musical introductions cued up so that you do not play any advertisements.*
  - The three musical introductions: [TED Talk](#) (only 8 seconds), [Google Intro](#) (only 7 seconds).
    - Students will record the basic emotion (happy/carefree, sad, fear, anger), tempo (slow, medium or fast), and pitch (low, medium or high) they feel the music is trying

to elicit for three different musical introductions using the [Musical Engagement worksheet](#).

- Follow-up Discussion: Facilitate discussion on the topic for each introductory music, but do not tell them what it was for. Reconnect the display and share the opening video with the audio for each introduction so that the students see what each is about.
- Present the [Musical Tempo and Pitch PowerPoint](#) slide and have students record the researched relationship between tempo, pitch, and emotions at the bottom of their [Musical Engagement worksheet](#).

*In the next section, students will be introduced to EarSketch, and how to program to make music.*

## EXPLAIN #1: Introduction to EarSketch

**Section Goal:** Students will familiarize themselves with *Getting Started* with EarSketch.

**Section Activity (Budget 45 minutes):**

[Getting Started with EarSketch](#)

*In the next section, students will understand the concept of composing music, and create their vocal stems.*

## EXPLORE #2 Explore the Concept of Composing Music

**Section Goal:** Students will begin to explore the concept of composing music, while thinking about the importance of conserving water.

**Section Activity (Budget 120 minutes):**

- Facilitate introductory discussion about composing music:
  - What are the different components of music?
    - From earlier—tempo, pitch, types of instruments, beats per measure
    - Volume, structure—is there a repeating chorus?
    - Vocals or lyrics
  - How do these things vary depending upon the audience and message?
- Selecting an audience
  - Students can work in groups or as individuals in deciding who their intended audience is.
  - Students should decide what vocals they would like to include in their song, and how these vocals support the message of water conservation. These vocals will be recorded and uploaded to EarSketch as musical stems and included in the same way as other instruments. Therefore, the length of the vocals will vary depending on the music—for instance, the music with a longer introductory melody will have shorter vocals than music that starts with

the vocal. *Each vocal stem* should be no longer than 4 seconds, which follows the length of each music measure.

- To get started, students will:
  - Write down the vocal stems, or lyrics, that will go into the two-minute song they will create and explain how the lyrics promote conserving the 1%.
  - Decide which instruments they would like to use in their music, what mood they are trying to create, and how they will create that mood.

*In the next section, students will record and add their vocals to EarSketch.*

## EXPLAIN #2: Uploading Vocal Stems

**Section Goal:** After the students create vocal stems, they will record the vocals and upload it on EarSketch.

**Section Activity (Budget 30 minutes):**

### [Upload Vocal Stems](#)

- Students will record their vocals by recording directly on EarSketch. Once the vocals are uploaded, they can be added to the Code Editor to add to their music.

*In the next section, students will begin creating their music.*

## EXPLORE #3: Creating a Musical Storyboard and Recording their Song

**Section Goal:** Students will begin creating their music using the DAW storyboard to get started on their musical design. Students will then transfer the DAW storyboard into code within EarSketch to develop and finalize their music.

**Section Activity (Budget 120 minutes):**

- Getting started with designing a DAW Storyboard of the music ([30 minutes](#)):
  - Model using the [DAW Storyboard worksheet](#) and facilitate class discussion on the emotional engagement students want to elicit in the music, and how they would design their music.
  - Hand out the [DAW Storyboard worksheet](#) to each student or group so that they can each design their own song.
- Coding the DAW storyboard in EarSketch by developing codes for the music ([90 minutes](#)):
  - The DAW storyboard will transfer over to EarSketch (teachers may demonstrate how this is done in class).

- Give time to the students to develop their music in EarSketch. Be sure the music meets all requirements:
  - A 2-minute song using EarSketch
  - Including vocals that promote the awareness of water conservation.

*Note for Teachers:* Students should be allowed some time to play with EarSketch while focusing on meeting their design goals. Be sure to strike a balance between giving students time to achieve a good result and allowing them to endlessly play. It is also a good opportunity to encourage students to work on their music outside of class – as long as they have the log-in information, they will be able to access their ongoing project files in any browser.

*In the next section, students will download their music and create a playlist.*

### EXPLAIN #3: Downloading and Creating a Playlist

**Section Goal:** Students will download their completed music as an mp3 file. They will also upload their music to the playlist on SoundCloud.

#### Section Activity (Budget 10 minutes):

- The music can be downloaded as an mp3 file:
  - Under Content Manager, go to Scripts → My Scripts. Click on the hamburger icon next to the script that will be shared, and select Download → mp3.
- Creating a playlist:
  - A playlist can be created using SoundCloud directly from EarSketch. Select the option to share the script via SoundCloud. This will enable users to either log-in using their SoundCloud account, or to register as a new user to upload their music. Once the music has been uploaded, click on More → Add to Playlist to create a playlist “Conserving the 1%.”

*The next section is optional – to expand on the basics of EarSketch and practice other skills.*

### ELABORATE Concept Expansion (Optional)

**Section Goal:** Conserving the 1% has three versions. To expand on the concept of writing scripts, refer to versions #2 and #3 below.

**Version #2 – Add sound effects via setEffect (Budget 60 minutes):** [setEffect](#)

**Version #3 – Create and add custom beats via makeBeat (Budget 60 minutes):** [makeBeat](#)

*In the next section, the lesson will be completed by measuring student understanding.*

## EVALUATE Wrapping Up

**Section Goal:** The final product of the lessons will be the music that is uploaded to the playlist. The following artifacts may be evidence of students' learning.

**Student Artifact:** EarSketch Code

**Suggested Activity:**

- Conduct a Playlist Showcase where students play their music and reveal their computer code.