



Technology in an Inclusive Classroom

Connecting STEM Redefined resources and classroom projects to student and teacher ISTE standards.

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ISTE STANDARDS

The International Society for Technology in Education (ISTE) Standards aim to guide the use of technology to create high-impact, equitable learning experiences for all learners. For over 20 years, the standards have continued to align with educational best practices and the UNESCO's Sustainable Development Goals. The standards target all members of an educational community: students, educators, education leaders, and technology coaches.

Oftentimes, the skill of cultural competency seems to introduce a separate, additional goal that an educator must teach. The ISTE standards open opportunities to justify and promote cultural competency in the classroom. As such, DEI practices are not extraneous lessons, but tools to help students and teachers achieve their greatest potential as a professional.

Empathy shows up explicitly in ISTE standards 2.2.a:

[Teachers] create experiences for learners to make positive, socially responsible contributions and exhibit empathetic behavior online that build relationships and community.

ISTE thus builds in the expectation that teachers must encourage empathy within their students, a key component of STEM Redefined's mission. Our organization aims to provide the tools to help this goal, along with other ISTE standards, come to fruition.

OUR CONTRIBUTION

STEM Redefined seeks to provide classrooms with digital tools that improve the learning experiences of both students and teachers. If applied, the curated collection of resources can aid the two parties in meeting their ISTE Standards. This document uses three cases to demonstrate connections between uses of STEM Redefined’s work and ISTE Standards.

This document directly quotes “ISTE Standards”:

Danielson, Charlotte. (2021). “ISTE Standards.” The Danielson Group. Retrieved from www.iste.org.



Case #1: Unit Assessment

Biology teacher Jo completed a unit related to Next Generation Science Standard core idea “Biological Evolution: Unity and Diversity.” The classes involved lessons on effects of changes in the physical environment on various species, including humans. Special focus is given to climate change and the difficulty of species to survive during this period of drastic change in our environment.

Students are given the opportunity to engage with this subject in a way that relates to their own lives. Using the Standard Connections library on the STEM Redefined website, students apply filters to identify subjects related to the LS4 NGSS standards. Elizabeth comes across the UC Berkeley News video “Amah Mutsun Tribal Band and archaeologists uncover ancient practices,” related to LS4.C: Adaptation.

She learns how human activities impacted redwood tree species in California, as well as the way Indigenous peoples can mitigate ecosystem destruction. Elizabeth decides to complete a project on the nearby state forest, finding how the forest has changed as told in primary sources. She pays special attention to whose records she is able to find and intentionally seeks information from the tribal nation who originally stewarded the forest, even interviewing members to learn about their relationship to the land.

Her final product is an online gallery of artwork depicting the forest scenes described in the primary sources. She consults the tribal nation before publishing the gallery, then shares the website with the state department of natural resources. Under the instruction of Jo, Elizabeth is careful to maintain her privacy while sharing her work online, and she uses her personal computer to keep her communication with various organizations and people confidential.

This case highlights the ability of STEM Redefined resources to promote personal connections to STEM lessons, as well as to encourage the use of online media to showcase creative knowledge-making processes. Students may take different approaches to a project like this, such as writing a blog post about the developments in the field of queer ecology or creating a short film about plants that have adapted to urban developments in their neighborhood. Through such an exercise, students and teachers meet the following standards:

→ Empowered Learner

- ◆ 1.1.a: Students articulate and set personal learning goals, develop strategies leveraging technology to achieve them and reflect on the learning process itself to improve learning outcomes.
- ◆ 1.1.c: Students use technology to seek feedback that informs and improves their practice and to demonstrate their learning in a variety of ways.

→ Digital Citizen

- ◆ 1.2.a: Students cultivate and manage their digital identity and reputation and are aware of the permanence of their actions in the digital world.
- ◆ 1.2.c: Students demonstrate an understanding of and respect for the rights and obligations of using and sharing intellectual property.

→ Knowledge Constructor

- ◆ 1.3.a: Students plan and employ effective research strategies to locate information and other resources for their intellectual or creative pursuits.
- ◆ 1.3.b: Students evaluate the accuracy, perspective, credibility and relevance of information, media, data or other resources.
- ◆ 1.3.c: Students curate information from digital resources using a variety of tools and methods to create collections of artifacts that demonstrate meaningful connections or conclusions.
- ◆ 1.3.d: Students build knowledge by actively exploring real-world issues and problems, developing ideas

and theories and pursuing answers and solutions.

→ Creative Communicator

- ◆ 1.6.a: Students choose the appropriate platforms and tools for meeting the desired objectives of their creation or communication.
- ◆ 1.6.b: Students create original works or responsibly repurpose or remix digital resources into new creations.
- ◆ 1.6.c: Students communicate complex ideas clearly and effectively by creating or using a variety of digital objects such as visualizations, models or simulations.
- ◆ 1.6.d: Students publish or present content that customizes the message and medium for their intended audiences.

→ Global Collaborator

- ◆ 1.7.a: Students use digital tools to connect with learners from a variety of backgrounds and cultures, engaging with them in ways that broaden mutual understanding and learning.
- ◆ 1.7.b: Students use collaborative technologies to work with others, including peers, experts or community members, to examine issues and problems from multiple viewpoints.

→ Citizen

- ◆ 2.2.a: Teachers create experiences for learners to make positive, socially responsible contributions and exhibit empathetic behavior online that build relationships and community.
- ◆ 2.2.b: Teachers establish a learning culture that promotes

curiosity and critical examination of online resources and fosters digital literacy and media fluency.

- ◆ 2.2.c. Teachers mentor students in the safe, ethical and legal practice with digital tools and protection of intellectual rights and property.
- ◆ 2.2.d. Teachers model and promote management of personal data and digital identity and protect student data privacy.

→ Designer

- ◆ 2.5.a: Teachers use technology to create, adapt and personalize learning experiences that foster independent learning and accommodate learner differences and needs.
- ◆ 2.5.b. Teachers design authentic learning activities that align with content area standards and use digital tools

and resources to maximize active, deep learning.

→ Facilitator

- ◆ 2.6.a. Teachers foster a culture where students take ownership of their learning goals and outcomes in both independent and group settings.
- ◆ 2.6.b. Teachers manage the use of technology and student learning strategies in digital platforms, virtual environments, hands-on makerspaces or in the field.
- ◆ 2.6.d. Teachers model and nurture creativity and creative expression to communicate ideas, knowledge or connections.

→ Analyst

- ◆ 2.7.a: Teachers provide alternative ways for students to demonstrate competency and reflect on their learning using technology

Case #2: Statistics Final Project

Students in Harish's AP Statistics class learn how to collect data, understand sampling distributions, and make inferences about various data types. At the end of the school year, Harish asks his students to complete a project that encompasses lessons from every unit. He encourages them to focus on problems that affect themselves, urging them to be problem-solvers for their community.

One student, Daniela, considers one issue she sees in the school cafeteria: a lack of vegetables for students to purchase. From browsing the STEM Redefined resources, Daniela knows that food security disparities are an important issue in her home state. She wonders if food insecurity can be observed in school cafeterias as well. She asks the research question, "How does race and income of a region impact the availability of vegetables in the region's local school?"

Daniela first develops a stratified sample of 30 schools across her county and the four neighboring counties. Using the STEM Redefined research guides, she collected population statistics on the ZIP code of each school using state census data. She also used the guides to develop a survey to ask students at the schools how often vegetables were on the menu for students.

In class, Daniela has shared that her cousins attend one of the schools in her sample. Harish knows the school is predominantly Hispanic, and many of its students are in ESL programs. As a result, Harish partners with the school Spanish teacher to support the translation of her survey into Spanish.

Daniela creates a research poster to demonstrate her findings, including graphs and maps demonstrating the link between the socioeconomic characteristics of a school district and availability of vegetables in the school-provided lunches. To complete her analysis of the issue, Daniela includes policy recommendations to promote healthy diets within the school lunch menu. Based on these efforts demonstrating data analysis and communication skills, Daniela earns a summer internship at the state department of agriculture.

The students in Harish's class use STEM Redefined resources to apply class lessons and solve real-world problems. The research guides help students complete independent research projects before entering college. They develop the skills to apply STEM for

public service projects, achieving proficiency in computational analysis and science communications. Teachers and students achieve the following standards when engaging in this type of final project:

- Empowered learner
 - ◆ 1.1.a. Students articulate and set personal learning goals, develop strategies leveraging technology to achieve them and reflect on the learning process itself to improve learning outcomes.
- Digital citizen
 - ◆ 1.2.b. Students engage in positive, safe, legal and ethical behavior when using technology, including social interactions online or when using networked devices.
- Knowledge Constructor
 - ◆ 1.3.a. Students plan and employ effective research strategies to locate information and other resources for their intellectual or creative pursuits.
 - ◆ 1.3.b. Students evaluate the accuracy, perspective, credibility and relevance of information, media, data or other resources.
 - ◆ 1.3.c. Students curate information from digital resources using a variety of tools and methods to create collections of artifacts that demonstrate meaningful connections or conclusions.
 - ◆ 1.3.d. Students build knowledge by actively exploring real-world issues and problems, developing ideas and theories and pursuing answers and solutions.
- Innovative Designer
 - ◆ 1.4.a. Students know and use a deliberate design process for generating ideas, testing theories, creating innovative artifacts or solving authentic problems.
- Creative communicator
 - ◆ 1.4.b. Students select and use digital tools to plan and manage a design process that considers design constraints and calculated risks.
 - ◆ 1.4.c. Students develop, test and refine prototypes as part of a cyclical design process.
 - ◆ 1.4.d. Students exhibit a tolerance for ambiguity, perseverance and the capacity to work with open-ended problems.
- Global Collaborator
 - ◆ 1.6.a. Students choose the appropriate platforms and tools for meeting the desired objectives of their creation or communication.
 - ◆ 1.6.b. Students create original works or responsibly repurpose or remix digital resources into new creations.
 - ◆ 1.6.c. Students communicate complex ideas clearly and effectively by creating or using a variety of digital objects such as visualizations, models or simulations.
 - ◆ 1.6.d. Students publish or present content that customizes the message and medium for their intended audiences.
- Innovative Designer
 - ◆ 1.4.a. Students know and use a deliberate design process for

ways that broaden mutual understanding and learning.

- ◆ 1.7.b. Students use collaborative technologies to work with others, including peers, experts or community members, to examine issues and problems from multiple viewpoints.

→ Citizen

- ◆ 2.2.a. Teachers create experiences for learners to make positive, socially responsible contributions and exhibit empathetic behavior online that build relationships and community.
- ◆ 2.2.b. Teachers establish a learning culture that promotes curiosity and critical examination of online resources and fosters digital literacy and media fluency.

→ Collaborator

- ◆ 2.4.a. Teachers dedicate planning time to collaborate with colleagues to create authentic learning experiences that leverage technology.
- ◆ 2.4.b. Teachers collaborate and co-learn with students to discover and use new digital resources and diagnose and troubleshoot technology issues.
- ◆ 2.4.c. Teachers use collaborative tools to expand students' authentic, real-world learning experiences by engaging virtually with experts, teams and students, locally and globally.
- ◆ 2.4.d. Teachers demonstrate cultural competency when communicating with students, parents and colleagues and interact with them as

co-collaborators in student learning.

→ Designer

- ◆ 2.5.a. Teachers use technology to create, adapt and personalize learning experiences that foster independent learning and accommodate learner differences and needs.
- ◆ 2.5.b. Teachers design authentic learning activities that align with content area standards and use digital tools and resources to maximize active, deep learning.

→ Facilitator

- ◆ 2.6.a. Teachers foster a culture where students take ownership of their learning goals and outcomes in both independent and group settings.
- ◆ 2.6.b. Teachers manage the use of technology and student learning strategies in digital platforms, virtual environments, hands-on makerspaces or in the field.
- ◆ 2.6.c. Teachers create learning opportunities that challenge students to use a design process and/or computational thinking to innovate and solve problems.
- ◆ 2.6.d. Teachers model and nurture creativity and creative expression to communicate ideas, knowledge or connections.

→ Analyst

- ◆ 2.7.a. Teachers provide alternative ways for students to demonstrate competency and reflect on their learning using technology

Case #3: The College Search

Eleventh grade physics teacher Geraldine is closing out the end of the school year with a discussion about college applications. Geraldine's students are apprehensive about pursuing a STEM degree in college, as their school district does not have many opportunities for research projects.

Geraldine allows her students some time to explore the "Day in the Life" videos on the STEM Redefined website. One student, Alex, knows that they enjoy coding, but nobody in their family has pursued computer science before. They have only been told that the subject often "weeds people out." They are not sure what types of careers they could pursue with that degree outside of app development, which he sees most often on social media.

Alex comes across the video "A Realistic Day in the Life of a Stanford Computer Science Major." They realize that computer science isn't an individual activity; the students often have group projects. They also hear about helpful websites that offer potential ways to code different tasks. Alex is a night owl, so they are relieved to see the vlogger's schedule matches their own. Alex also sees a video by a software engineer, which informs them about stable positions outside of entrepreneurship.

Alex navigates to the Stanford computer science department website, where they find the page "High School Students' FAQ." Alex reads through the major requirements, and they decide to set up a meeting with the course advisor. They also reach out to the blogger via their Stanford email to learn more about their pathway. In the next year, Alex applies to a variety of schools as an intended CS major.

Alex demonstrates the potential of the STEM Redefined library to empower students to pursue STEM. By watching successful STEM majors and professionals in a relatable, familiar context of a "vlog," high school students can develop the confidence to continue down the STEM pathway. Students are also led to further resources that increase their knowledge about STEM beyond the high school classroom. Their network thus expands to improve college-readiness and the overall learning process. Whether introduced in the classroom or found independently, students and teachers meet the following standards through the Day-in-the-Life library:

→ Empowered learner

- ◆ 1.1.b: Students build networks and customize their learning environments in ways that support the learning process.

→ Digital citizen

- ◆ 1.2.a. Students cultivate and manage their digital identity and reputation and are aware of the permanence of their actions in the digital world.
- ◆ 1.2.b. Students engage in positive, safe, legal and ethical behavior when using technology, including social interactions online or when using networked devices.

→ Creative communicator

- ◆ 1.6.a: choose the appropriate platforms and tools for meeting the desired objectives of their creation or communication.

→ Citizen

- ◆ 2.2.b. Teachers establish a learning culture that promotes curiosity and critical examination of online resources and fosters digital literacy and media fluency.

→ Collaborator

- ◆ 2.4.c: Teachers use collaborative tools to expand students' authentic, real-world learning experiences by engaging virtually with experts, teams and students, locally and globally.

→ Designer

- ◆ 2.5.a: Teachers use technology to create, adapt and personalize learning experiences that foster independent learning and accommodate learner differences and needs.

