



Welcome to BSD **START**. This document is intended to guide you through the course. Your journey will begin with a few introductory videos to get you familiar with our platform as both the teacher and the student. As you travel through the document you will find specific details regarding the projects including objectives, standards, and a suggested walkthrough with teaching tips along the way.

This guide is intended to help you set the pace for this project, it is not a substitution for a lesson planning document. To become more acquainted with the curriculum, work through the course on the platform ahead of time to prepare for teaching.

### **Getting Started**

Watch these quick videos to get acquainted with the BSD platform.

Teacher Experience Video

Student Experience Video

BSD Online Community Resources

Additional Teacher Resources

### **Course Structure**

At the start of this course, students will complete a 3-question pre-test to gauge their current knowledge of coding and digital skills. Then the student will be guided through three projects. Upon completion of each project, students are able to open their projects in sandbox mode. Sandbox mode unlocks all the code so students can explore and create new versions of their projects and customize any aspect of it.. Students will then complete a post-test to gauge their learning, not as a grade, but to celebrate learning new skills.. At the end of the course, students will complete a capstone project where they will put their new skills to use in making a multi-page website.

# **Course Projects**

<u>The People Who Inspire Me</u> <u>Difficulty: Level 1: Beginner</u> <u>Duration: 1-hour</u>

- Students will build a web page showing the top three people who inspire them while learning introductory skills in HTML and CSS.
- This project includes videos to guide the students and additional resources for the teacher and students.



#### Trivia Game Maker

**Difficulty:** Level 2: Intermediate **Duration:** 1-hour

- Build an interactive trivia game and make your own trivia questions. Along the way, learn to start using JavaScript to make interactive web pages
- This project includes videos to guide the students and additional resources for the teacher and students.

#### Al Webcam Image Classifier Difficulty: Level 4: Advanced Duration: 2-hours

- Build an AI image classifier (powered by machine learning) that uses data from your webcam to classify objects. Train it to recognize and classify new objects!
- This project includes guided instruction, discussion questions, and additional resources for the teacher and students.

#### **Capstone Project**

**Difficulty:** Level 3: Intermediate **Duration**: 2-4 hours

 A multi-page website is the most popular type of website for businesses, brands, organizations, or personal websites. You will have the opportunity to choose a theme as well as the content, images, fonts, and colors.

### **Project Structure**

These projects are designed to be led by an instructor in a virtual, hybrid or offline learning environment, with the possibility of allowing students to complete the Guided Project self-paced or asynchronously. Upon the completion of the Guided Project, the students will have their own digital artifacts customized to their individual creative visions and ideas.

Following our 3-step approach to curriculum **Explore, Learn & Create**, learning unfolds by *exploring* new concepts, *learning* tools, and methods needed to produce a digital artifact and then *creating* the artifact in a Guided Project.



**Explore:** Students will be introduced to coding through two projects that allows them to share their unique voices and interests.

Students will also explore artificial intelligence and the technology behind modern vision recognition systems



**Learn:** The People Who Inspire Me and Trivia Game Maker are aided by video tutorials that walk through each step of the coding process, allowing for an easy transition into coding with HTML and CSS.

With the AI Webcam Image Classifier, students will design and program AI tools using JavaScript and HTML.





**Create:** At the end of the course students will have four digital artifacts that are unique with customization. The project can be shared using a public URL or QR code.

### **Teacher Resources**

Multi-Page Website - Planning Document
BSD Project Rubric
What is Coding
Introduction to HTML and CSS
Introduction to JavaScript

Debugging Tips
Adding Webfonts - Google Fonts
Hex Color Code
Search and Add Images
Multi-Page Website Capstone Guide
Multi-Page Website Planning Document

### **Pre-Test**

As the teacher you are able to add or remove questions. You also have the option to shuffle the questions and let the students see their score. This Pre-Test is not intended for assigning a grade but rather shows learning growth.

**Question 1:** If you want to change the background color using hex color codes, which of the following shows an example of "hex code"?

Answer 1: #87ceeb

**Question 2:** In the JavaScript code below, what does "const" mean?

**Answer 2:** "const" is used to declare a variable

**Question 3:** If you wanted to insert an image file "pizza-on-plate.jpg" what would be the correct HTML syntax?

**Answer 3:** <img src="/resources/pizza-on-plate"



# The People Who Inspire Me



### **Project Overview**

This introductory project allows students to use code as a way to share what is important or interesting to them. This project provides a way for students to either follow along in the lesson or create their own unique project, all while learning to program in HTML, CSS, and JavaScript. Students are guided through the experience with video tutorials, live coding, and access to the BSD code glossary. The People Who Inspire Me is also a great resource as a primer for educators to learn the basics of HTML, CSS, and JavaScript that will prepare them for teaching with other BSD courses.

# **Learning Objectives**

The BSD The People Who Inspire Me project aims for students to:

- Develop a fundamental understanding of HTML and CSS.
- Build digital artifacts using HTML and CSS.
- Expand their knowledge and understanding of the real-world application of technology tools across different industries
- Exercise the fundamental principles and processes of computational thinking, design thinking, and user experience design

### **Project Standards Alignment**

BSD Education's curriculum is aligned with the International Society for Technology in Education and Computer Science Teachers Association Standards. These standards are for your reference and exploration, and may not directly apply to your school/country.



	The People Who Inspire Me
ISTE	1a, 2c, 4a, 5d, 6b, 6d
CSTA	1A-AP-08, 1A-AP-13, 1A-AP-14, 1B-AP-14, 1B-AP-15, 1B-IC-21, 2-DA-07, 3A-AP-16, 3A-AP-18

#### ISTE: the International Society for Technology in Education

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#### **CSTA - Computer Science Teachers Association**

"These Standards are designed to provide clear guidance around effective and equitable CS instruction in support of rigorous CS education for all K-12 students around the world." Click HERE to find out more about CSTA.

### Project Vocabulary

All vocabulary definitions are located in the glossary, which contains definitions, syntax, examples and interactive steps.

HTML	CSS	syntax
tags	forward slash /	<hr/>
angle brackets	element	>
start tag/open tag	<h1></h1>	<img src=""/>
end tag/closed tag	<h2></h2>	selector
color	text-align	width
		рх

# **Guided Project Instructions**

- 1. Video: 4:09
  - a. The students will be introduced to:
    - i. How websites work
    - ii. Coding languages (HTML, CSS)
    - iii. Vocabulary
      - 1. HTML, CSS, syntax, tags, angle brackets, start tag/open tag, end tag/closed tag, forward-slash (/), element)



Teaching Tip:

Watch the videos as a whole group. This allows for both the teacher and students to explore and learn together.

- 2. The students will be introduced to the project, "The People Who Inspire Me".
- 3. Video: 3:07
  - a. During this video, students will be introduced to the platform.
    - i. Leftside: instructions, glossary cards, and objective(s)
    - ii. Middle: code panel/input
    - iii. Rightside: output
  - b. Students will also watch a demonstration of Step #4
    - i. Vocabulary
      - 1. <h1>
- 4. Students will create a heading for the website by using an <h1> element.
- 5. Video: 3:42
  - a. The students take a closer look at CSS.
    - i. Vocabulary
      - 1. Selector, property, value, curly braces {}, (:) colon after property, (;) semicolon after value, color, text-align
- **Teaching Tip**: Common error for students: forgetting to add the semi-colon (;) at the end of a line of code in style.css.
  - 6. In this step, students will add CSS by switching to the style.css file.
    - a. Students will change the heading's color using the color property and align it to the center of the page using the text-align property.
      - i. Vocabulary
        - 1. style.css, color, text-align
  - 7. Video: :52
    - a. Students are provided with additional details regarding their projects.
      - i. 3 people, names, images of those people, short description
  - 8. Next, students will create a subheading to show the first person's name using the <h2> element.
  - 9. Students will now go to the style.css file to change the color of the person's name using the color property as they did for step #6.
- Teaching Tip: In this step, students are asked to type in #873600 which is a Hex Color Code. Use this <a href="Hex Code PDF">Hex Code PDF</a> document to take a deeper dive into what Hex Colors are.
  - 10. Video: 2:21



- a. Students are introduced to adding images to their projects.
  - i. Vocabulary
    - 1. img src, self-closing tag, image URL, image address.
- Teaching Tip: This is a perfect time to discuss copyrights and creative commons. Which images am I allowed to use? How do I give credit to the owner of the image?
  - 11. Students will now add an image of the first person that inspires them.
  - 12. Video::59
    - a. Students are introduced to resizing images in style.css
    - b. Vocabulary
      - i. img, width, px
  - 13. Students will resize their images.
  - 14. Students will write a brief description of the person that inspires them.
    - a. Vocabulary
      - i.
  - 15. Before the student adds the information for their second person, they will be instructed to create an <hr/> element to separate the content between each person.
    - a. Vocabulary
      - i. <hr/>
  - 16. Video: 1:25
    - a. In this video, students are reminded of how they added the first person to their website so they can continue with persons #2 and #3.
- **Teaching Tip**: Remind students that they can use the glossary cards if they get stuck or they can rewatch any video.
  - 17. Students will now add the code for the second person.
    - a. Steps 8, 11, and 14 are being repeated
    - b. Vocabulary
      - i. <h2>, <img scr>,
  - 18. Students will now add the code for the third person.
  - 19. Video: 2:49
    - a. In the last video, students will review
      - i. What they have learned.
      - ii. How to export their project.
      - iii. How to continue in sandbox.
      - iv. How to customize their project.
  - 20. The last step of the project is a verbal description of what the student learned



### **Follow-up Questions**

- 1. What did you make today?
- 2. What coding language did you learn today?
- 3. Was there anything that was challenging that you had to overcome?
- 4. By bringing this project into sandbox mode, you can change any of the code. What will you make next?

### Sandbox

• Students can open their projects into sandbox mode for further customization.

# **Core Subject Integration**

- Social Studies: People that Made History, Periods of Time
- ELA: Authors, Poets, Book Review
- Science: Inventions, Scientists
- Math: Architecture that demonstrates geometry, mathematicians

# Peer sharing/evaluation

Set the student devices up, with their project loaded as if the students were attending a museum. The students will go from device to device to observe each person's project. At each desk, you will also have a comment sheet for each of your visitors.



### Trivia Game Maker



### **Project Overview**

This introductory project allows students to use code as a way to share what is important or interesting to them. This project provides a way for students to either follow along in the lesson or create their own unique project, all while learning to program in HTML, CSS, and JavaScript. Students are guided through the experience with video tutorials, live coding, and access to the BSD code glossary. Trivia Game Maker is also a great resource as a primer for educators to learn the basics of HTML, CSS, and JavaScript that will prepare them for teaching with other BSD courses.

### **Learning Objectives**

The BSD Trivia Game Maker project aims for students to:

- Develop a fundamental understanding of HTML and JS.
- Build digital artifacts using HTML and JS..
- Expand their knowledge and understanding of the real-world application of technology tools across different industries.
- Exercise the fundamental principles and processes of computational thinking, design thinking, and user experience design

# **Project Standards Alignment**

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	Trivia Game Maker
ISTE	1a, 2c, 4a, 5d, 6b, 6d
CSTA	1A-AP-08, 1A-AP-10, 1A-AP-11, 1A-AP-14, 1B-AP-09, 1B-AP-10, 1B-AP-15, 2-AP-11, 2-AP-13, 3A-AP-16, 3A-AP-18

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### Project Vocabulary

All vocabulary definitions are located in the glossary, which contains definitions, syntax, examples, and interactive step

# **Guided Project Instructions**

Teaching Tip:

Watch the videos as a whole group. This allows for both the teacher and students to explore and learn together.

- 1. Video: 1:26
  - a. The students will be introduced to:
    - i. The next project titled Trivia Game Maker
    - ii. Introduction to the third coding language called JavaScript
    - iii. Vocabulary
      - 1. JS (JavaScript)



- 2. Students will have the opportunity to test a sample trivia game.
- 3. Students will add an <h1> (heading 1) element in HTML.
- 4. Students will add a (paragraph) element in HTML.
- 5. Video: :57
  - a. The students will learn how to create a button in HTML first.
    - i. First, the button will be added to HTML using the start and end tags (<button>)
    - ii. To make the button work, you need to add JavaScript, which will be done later.
- Teaching Tip:

When working in JavaScript, you have to first create in HTML and then add the "action" in JavaScript.

- 6. Students will create a button element in HTML.
- 7. Video: 1:44
  - a. The students will learn about the onclick attribute.
    - i. To link our <button> and JavaScript code together, the students will add an onclick attribute and call it quiz().
    - ii. To make the button work, you need to add JavaScript, which will be done later.
- 8. Students will create an onclick attribute.
- 9. Video: 2:21
  - a. The students will be introduced to a JavaScript function.
    - i. A specified block of code that only runs when you call it.
      - 1. To run or execute a function is known as calling a function.
      - 2. Once you write the code and name it, the next time you need to use that same code you can call the function by its name.
- 10. Students will now make their button work by linking their HTML element to the JS Function.
  - a. Click on script.JS file and create a function.
  - b. In HTML, you created an onclick and called it quiz(). That means our function also needs to be called quiz()!
- 11. Video: 2:32
  - a. The students will create a popup box in JavaScript called an alert.
  - b. What we want the alert to say will be added in between the quotation marks. This is called a string.
- 12. Students will now create a popup box to welcome their players.
- 13. Video: 6:11
  - a. The students will learn how to add the trivia questions.
    - i. Create a prompt box to display a question with a text field for the participant to respond in.



- ii. Create or declare a variable for a1.
- 14. The students will create or declare a variable and prompt for each of their questions.
- **Teaching Tip**: Remind students that

Remind students that they can use the glossary cards if they get stuck or they can rewatch any video.

- 15. Video: 4:15
  - a. The students will learn how to use JavaScript to see if the player answered correctly.
    - i. Create a conditional statement or an if-statement.
    - ii. Create an else statement.
- 16. The students will create a conditional statement for each answer.
- 17. The student will create an alert notifying the player of a correct or incorrect answer.
- 18. Video: 1:32
  - a. The students will learn how to create a scoring system.
    - i. Create a score variable to store the number of correct answers.
    - ii. Create a totalQuestions variable to store the number of questions we will ask.
- 19. The students will create a core variable and a totalQuestions variable.
- 20. Video: 1:36
  - a. The students will learn how to increase the score for every correct answer using arithmetic operators.
    - i. Increase the score variable by 1 for every correct answer.
- 21. The students will create a +1 to the score variable for each of the 3 questions.
- 22. Video: 2:20
  - a. The students will learn how to join strings and variables (concatenation)
- 23. The students will create an alert to tell the player what their total score was.
- 24. The last step reviews all concepts learned during the project.

### Follow-up questions

- 1. What did you make today?
- 2. What coding language did you learn today?
- 3. Was there anything that was challenging that you had to overcome?
- 4. By bringing this project into sandbox mode, you can change any of the code. What will you make next?



### Sandbox

• Students can open their projects into sandbox mode for further customization.

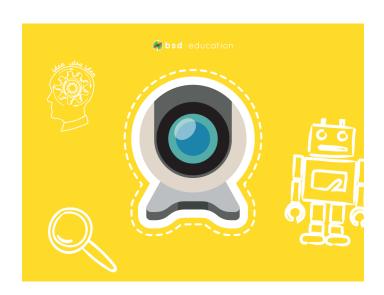
## **Core Subject Integration**

Change from trivia questions to review questions for your core subject area.

# Peer sharing/evaluation

Set the student devices up, with their project loaded, as if the students were attending a museum. The students will go from device to device to observe each person's project. At each desk, you will also have a comment sheet for each of your visitors.

# Al Webcam Image Classifier



### **Project Overview**

In this project, we will explore an Artificial Intelligence(AI) Image Recognition tool and learn how AI sees images, makes predictions, and how we can make sure that those predictions are accurate and free of bias. Inside the field of AI, there is a specific set of neural networks and algorithms that we call Machine Learning. In this project, we will use a Machine Learning algorithm that is helpful in making predictions.



## **Learning Objectives**

The BSD AI Webcam Image Classifier project aims for students to:

- Gain an understanding of how Machine Learning works.
- Explore AI concepts like prediction and classification.
- Understand the importance of clean and bias-free training data for Machine Learning.
- Explore how to make Machine Learning algorithms more accurate
- Explore and learn about types of pre-trained neural networks used for Al.
- Build digital artifacts using HTML, CSS, and JavaScript
- Expand knowledge and understanding of the real-world application of technology tools across different industries
- Exercise more advanced principles and processes of computational thinking, design thinking, and user experience design

### **Project Standards Alignment**

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	Al Webcam Image Classifier
ISTE	1a, 3d, 4a, 4b, 4c, 5a, 5b, 6b
CSTA	1A-DA-07, 1A-AP-08, 1A-AP-09, 1A-AP-14, 1B-DA-06, 1B-DA-07, 1B-AP-08, 1B-AP-09, 1B-AP-10, 1B-AP-11, 1B-AP-12, 1B-AP-15, 2-AP-11, 2-AP-13, 2-AP-14, 2-AP-17, 2-IC-21, 3A-AP-17, 3A-AP-18, 3A-AP-21, 3A-AP-23, 3A-IC-24

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### **Project Vocabulary**

All vocabulary definitions are located in the glossary, which contains definitions, syntax, examples and interactive steps.



Artificial Intelligence id

pixel (PX) <button> KNN Classifier

<script> function onclick MI5.js variable obj3.1

<div> style

### **Guided Project Instructions**

- 1. Teachers and students will be introduced to the Artificial Intelligence (AI) Image Recognition tool.
- 2. Discussion: A webcam can be used to see, but how does a computer recognize something?
- 3. Pixels and pixel values
  - a. A computer can use a program to analyze an image by breaking it down into smaller parts. The smallest part of an image is called a pixel, and each pixel can have a value between 0-255. Computers are best at using numerical values and cannot see images the way we do.
- 4. Discussion: Why do you think AI has a difficult time making predictions?
  - a. Al may seem very intelligent, but it can still make mistakes. Sometimes those mistakes are silly, but they could also have negative consequences too. If images or other data are too similar, Al may have trouble distinguishing between the small differences.
- 5. Students begin learning about predictions
- 6. How does AI become good at predictions?
  - a. To be consistent at predicting, an AI needs to see lots of examples sometimes thousands!
- 7. Students are given directions on how to explore the Artificial Intelligence (AI) Image Recognition tool.
  - a. Add 10 images to "class one"
  - b. Add 10 other images to "class two"
  - c. Click on "Training & Predict"
- 8. Students will explore the AI Image Recognition tool.



- 9. Discussion: How well did Al recognize your data? What could you do to make better predictions?
- 10. Bias in training data: The AI or machine learning tool will only ever be as good as the provided training data. Poor training data will result in poor predictions.
- 11. Types of data bias Lack of data: If you are training an image recognition tool to recognize apples and bananas and only provide 2-3 training images, then the tool won't be able to predict the many different shades of red and yellow found in the fruits.
- 12. Types of data bias Data is not diverse: If you are training an image recognition tool to recognize apples and bananas, and only provide training images of the exact same apple and banana each time, then the tool will only be able to predict that one type.
- 13. Types of data bias Data is not clear: If you are training an image recognition tool to recognize apples and bananas and all of the images are low quality, then the machine learning tool won't correctly predict high-quality images.
- 14. Students will begin coding
- 15. Students will import the **ml5.js** library into their project using the <script> element.
- 16. Students will create two "containers" using <div> elements one for "Class One", and another for "Class Two".
- 17. Students will add a <button> and a <div> to the "classOne" <div> element.
- 18. Students will add a <button> and a <div> to the "classTwo" <div> element.
- 19. Students will add a training and predict button.
- 20. Students will create a <div> element for the video container and a element for the output panel.
- 21. Students will go into JavaScript to enable the webcam.
- 22. Students will create a variable called featureExtractor. Then they will load the pre-trained model using the ml5.featureExtractor function.
- 23. Students will create a new variable called knnClassifier. They will use knnClassifier to train the computer to classify the given features from featureExtractor.
- 24. Students will switch back to HTML to add an onclick event to both the class buttons. Then, when buttons are clicked, they will call the addToClass function and send the number 1 or 2 as an argument based on the class number. Then they will switch back to the script.js file to declare a variable that will extract the key



features from the webcam video:

- 25. After the key features have been extracted from the webcam, students will store the features and the class label to an object.
- 26. Students will add an onclick event to the "Training & Predict" button, which they have stored to a variable named trainingBtn. When this button is clicked, it'll call the training function. In the training function, we'll call the knnClassifier.clearAllLabels() function to clear all the previous labels, and then add the new examples to knnClassifier.
- 27. Finally, students will call the goClassify function when the training model is ready. Then in the goClassify function, we'll extract the key features from the webcam and call the knnClassifier.classify function to predict the result from the webcam video.
- 28. The last step reviews all concepts learned during the project.
- **Teaching Tip**: Each image should have a different object, and if possible, try to use images with transparent backgrounds.
- **Teaching Tip**: Now that students have some experience with artificial intelligence, consider exploring the ethics of Al. How does digital citizenship play a role in artificial intelligence?

### Follow-up Questions

- 1. What did you make today?
- 2. What coding language did you learn today?
- 3. Was there anything that was challenging that you had to overcome?
- 4. By bringing this project into sandbox mode, you can change any of the code. What will you make next?

## Sandbox

• Students can open their projects into sandbox mode to train a new series of objects. For example, students could create a facial recognition tool.

# Peer sharing/evaluation

Set the student devices up, with their project loaded, as if the students were attending a museum. The students will go from device to device to observe each person's project. At each desk, you



will also have a comment sheet for each of your visitors.

### **Post-Test**

As the teacher you are able to add or remove questions. You also have the option to shuffle the questions and let the students see their score. This Pre-Test is not intended for assigning a grade but rather shows learning growth.

**Question 1:** In the JavaScript code below, what is the name of the variable?

Answer 1: const

Question 2: Which line of CSS code defines the size of the text of the <h1> element?

Answer 2: font-size: 46px;

**Question 3:** The code below shows a CSS rule for styling an <h3> element. How is the value of the color property defined?

Answer 3: HTML color code

### **Capstone Project**

The Capstone Project allows students to show what they have learned so far. In sandbox mode, there are no guided steps, which means they can edit anything in the code that they would like to.

- 1. Review the <u>Multi-Page Website Capstone Guide</u> with the students
- 2. Have the students use the <u>planning document</u> to guide their design.
  - a. Students will use the planning document to complete a final copy of their layout and design.
  - b. The planning document is broken down into sections for each page.
  - c. The headings at the top of each section can be modified based on the purpose of the student's website.
    - Science: Human Anatomy Epidemiology
    - Career/College/Goals: All About Me, digital portfolio
    - Social Studies/History: Timelines, Eras, Wars
    - ELA: author/book reviews
    - Digital Citizenship: Create a fake website, Public Service Announcement
    - Personal Interests: sports, music, block building
    - Community involvement
- 3. Have the students refer to the **Coding Resources** if they get stuck.
  - o What is Coding
  - Introduction to HTML and CSS



- o <u>Introduction to JavaScript</u>
- Debugging Tips
- o Adding Webfonts Google Fonts
- Hex Color Code
- o <u>Search and Add Images</u>
- 4. They can also use the **Glossary** to help with coding syntax examples.
- 5. Review the expectations of the project.
  - a. Use the provided <u>BSD's Project Rubric</u> for evaluation.
- 6. When students complete their website, have students view, evaluate and comment on each other's final project.