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7/1/15

0. Abstract

I. Standards/Skills/Objectives/Assessment

1. Focal Standard or Skill: \* Required
2. Measurable Objective(s): \* Required
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4. Additional Standards (Optional)

II. Fellowship Connections

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2. 21st Century Skill(s) Application:\* Required (Exempt, if you did Focal Standard/Skill 1a)
3. Fellowship Description:\* Required
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# Vocabulary Development: Scatter Plots and Correlation

## 0. Abstract

*Please provide a few sentences as an abstract for your curriculum. An abstract should be a paragraph that enables another teacher to establish what your curriculum addresses quickly and easily **in 150 words or less**. [Click here](#) to see sample abstracts!*

### **Abstract:**

This lesson is designed to address the Statistics and Probability cluster of the CCSS: Mathematics 8th grade standards. The lesson will be taught in order to strengthen students understanding of data sets and the use of scatter plots to analyze the data. I will bring in data that I collect while working in the lab this summer. The students will then learn about different academic vocabulary used to describe patterns and trends that scatter plots can show. The students will be assessed formatively during the lesson through observing how students describe scatter plots both verbally and in written form. Then students will be given a summative assessment where they must write sentences describing different scatter plots and the trends that they see as an exit ticket and a homework assignment.

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## I. Standards/Skills/Objectives/Assessment

### 1. Focal Standard or Skill:\* Required

*Please include the full text of ONE standard or skill that will be modeled, practiced and assessed in your lesson. **Please highlight which one you choose; a, or b.***

- a. *21st Century Skill: Implemented throughout the school year, in this ETP you will identify one 21st Century skill, integrate it across multiple lessons, and give specific examples of how it can be incorporated through the year. Describe how this 21st Century skill will strengthen and support the lessons/units in which this skill will be incorporated. Provide 2 - 3 sample lessons that illustrates how this 21st Century skill will be practiced and how it will strengthen your classroom.*
  - i. *Choose a content(s) standards in which will help you carry out the 21st Century skill; California Content Standard, California Common Core Standard (CCCS), or Next Generation Science Standard (NGSS). If you will not meet the entire standard with your lesson, please bold the parts of the standard that will be met, taught and assessed. If you are using NGSS, please include*

*the full text of one Performance Expectation in this box. [Click here](#) to see examples.*

- b. Choose a content(s) standards; [California Content Standard](#), [California Common Core Standard \(CCCS\)](#), or [Next Generation Science Standard \(NGSS\)](#). If you will not meet the entire standard with your lesson, please bold the parts of the standard that will be met, taught and assessed. If you are using [NGSS](#), please include the full text of one Performance Expectation in this box. [Click here](#) to see examples.*

### **Focal Standard or Skill:**

CA CCSS Mathematics Standards

8.SP.1 - Construct and interpret scatter plots for bivariate measurement data to investigate patterns of association between two quantities. Describe patterns such as clustering, outliers, positive or negative association, linear association, and nonlinear association.

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### **2. Measurable Objective(s): \* Required**

*In the field below, please include 1-3 measurable objectives explaining what students will do that will demonstrate their ability to apply the focal standard or skill above. [Click here](#) to see examples.*

#### **Measurable Objective(s):**

**Students will be able to classify the type of correlation shown in a scatter plot.**

**Students will be able to describe correlation using academic vocabulary both verbally and written down.**

### **3. Assessment: \* Required**

*Please list assessment tools needed to measure the objectives listed. Assessment tools should assess students ability to apply and/or demonstrate the standard/skill, not just memorize it. If the assessment is a test, most of the items should directly assess the identified standard/skill. [Click here](#) for assessment samples.*

#### **Assessment:**

**Students will be assessed in a variety of ways. The teacher will use a series of formative assessments to collect data during the lesson and also a summative assessment after the lesson**

is complete. The first formative assessment that the teacher will use is questioning the students and having students share their initial sentences to see if students are using the academic vocabulary appropriately. Later on in the lesson the students will write further sentences on mini-white boards so that the teacher can get feedback from all students on how their learning is going. A quick exit ticket will see what students learned individually about the vocabulary and their use. The summative assessment will be in the form of a homework assignment where students are asked to write sentences to describe a series of scatter plots using the studied academic vocabulary. The teacher will assess the accuracy of student academic vocabulary use in the sentences on the homework assignment.

#### 4. Additional Standards (Optional)

*You may add additional standards or skills that are addressed in your ETP. These can be the International Society for Technology in Education (ISTE®) Standards, ITEA (International Technology Engineering Educators Association)? or National Board standards, Common Core Standard, Next Generation Science Standard (NGSS), 21st Century Skills as well as other California adopted standards that will also be practiced/used in your ETP. If you are using NGSS, here is where you should include the relevant Science and Engineering Practices, Disciplinary Core Ideas and Crosscutting Concepts. [Click here](#) to see examples.*

**Additional Standards/Skills:**

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## II. Fellowship Connections

### 1. 21st Century Skill(s):\* *Required (Exempt ,if you did Focal Standard/Skill 1a)*

*In the space below, please include the full text of at least one 21st Century Skill from the 21st Century Framework that will be practiced in your lesson. [Click here](#) to see examples.*

**21st Century Skill(s):**

**Learning and Innovation Skills: Making Judgements and Decisions**

- Interpret information and draw conclusions based on the best analysis

### 2. 21st Century Skill(s) Application:\* *Required (Exempt, if you did Focal Standard/Skill 1a)*

*In the space below, please include a short description of how the skill(s) you listed in the previous field will be practiced by students or school members in your lesson. [Click here](#) to see examples.*

**21st Century Skill(s) Application:**

Students will practice the 21st century skill throughout the learning activity. Students are first given information about the context of the data set they will be looking at and asked to interpret the data through this lens. Students will be given time to interpret the data and discuss it with their peers. When students have come to a consensus around what the data set shows they will finally use that analysis to make a conclusion regarding the context of the initial data set.

### 3. Fellowship Description: \* Required

*Briefly describe:*

- 1) *Your Fellowship project*
- 2) *Skills you are using*
- 3) *Types of careers to which you are being exposed.*
- 4) *The work your sponsor is doing.*

[Click here](#) to see examples.

#### **Fellowship Description:**

The fellowship project I am working on is taking place in an Electrical Engineering research lab on the UC Berkeley Campus. The lab has been focusing its efforts in the area of printable electronics and my role in the lab was in this area. I looked at the effects of light, heat, and x-rays on the nanolayer films that the lab prints. I used a variety of skills ranging from all the technical skills of working with chemicals in a lab to critical thinking required to analyze the data that we generated. The work my sponsor is doing is in a similar area with one major difference. He is working on printing nanolayers of copper metal while I worked on nanolayers of silver metal.

The type of career path that I am being exposed to is one of a researcher at a public university. Most of the researchers who also worked in the lab are undergrad, graduate, or post docs in the Electrical Engineering field. Some of the researchers continue to work in the lab as they finish their studies but others move to industry after they have completed their degrees.

### 4. Fellowship Connection to School/Classroom: \* Required

*Please describe how you plan to share your Fellowship experience with your students or other school members as part of your instructional plan. Please include how you will share this information in an exciting/inspiring way and how your focal standard is relevant to work with this sponsor organization. [Click here](#) to see examples. **If there are documents in how you will be sharing this connection please list the name of the document and add it to the list of attachments.***

#### **Fellowship Connection to School or Classroom:**

**Pushing the boundaries of our understanding of the world around us is at the forefront of work that is done at research labs at UC Berkeley. When we don't know the answer to a question scientists devise tests and analyze the results in order to come to conclusions about what was**

previously unknown. In my instructional plan I will expose my students to the work that I am doing in the lab and have the students analyze the data that I am looking at to discover an unknown. I will also schedule a lab visit for my students so my students can visualize themselves in the summer fellowship experience. They will get a tour of the lab with a possibility of sending one of my students to the lab in the future to intern.

My focal standard is relevant to my work at UC Berkeley because as a researcher I will constantly be looking at data and analyzing it to look for patterns and conclusions that I could draw from it. The focal standard I have picked is this exact same work.

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### III. Instruction

#### 1. Instructional Plan: \* *Required*

*Please provide a clear instructional plan of one lesson aligned to your focal standard. The instructional plan should describe how you will directly model the focal standard, provide guided practice of the standard, have students practice the standard with each other/by themselves, and assess the standard. It should be detailed and clear enough that you or another teacher well-versed in the subject area can easily implement the plan. Please reference attachments by title where they will be used in the lesson. [Click here](#) to see a sample instructional plan.*

#### **Instructional Plan:**

1. Warm Up Activity (10 min) -> Students will engage in a brief warmup activity designed to activate their prior knowledge around the coordinate plane. During this time students will be shown a coordinate plane with a line drawn on it (can be any straight line) and they will be asked to:

- write the coordinates of one of the points on the line
- decide if the line has a positive or negative slope
- fill in the sentence frame for each variable -> when 'x' increases, the 'y' \_\_\_\_\_

Students should all write down an answer to the first prompt. Students can discuss in pairs the answer to whether the line has a positive or negative slope. The third prompt will also be completed by all students. Encourage students to use the names of what the variables stand for instead of the variable name (height of the person instead of 'x'). Have students share answers to the first prompt and make a big list. Have one or two students share their sentence and show how you can see that increase/decrease on the graph and list of points from the line drawn.

2. Introduce work from IISME summer lab (5 min)-> after the warm up activity the teacher will describe the work that he did in the research lab over the summer.

- Synthesizing Silver Nanoparticles
- Formulating Inks with Silver Nanoparticles
- Printing said Inks
- Performing Conductivity tests on printed inks
- Analyzing results of conductivity tests

Teacher explains how research work generates loads of data and that data needs to be analyzed through the use of scatter plots. See attachment 2 fellowship / classroom connection.

3. academic vocabulary (30 min) -> teacher begins instruction on the academic vocabulary of the lesson

- correlation
- no correlation
- positive correlation
- negative correlation
- strong correlation
- weak correlation
- linear association
- nonlinear association

See attachment 4 - Vocabulary Instruction. The vocabulary instruction power point first ask students to look at two scatter plots and describe what they see. The two graphs show a strong correlation and a no correlation scatter plot. Students can discuss in small groups before sharing their thoughts with the whole class. Once students have a general idea about what a correlation is the instruction shifts into a discussion around the different types of correlations. Students are shown opposing examples (strong v. weak; linear v. nonlinear; positive v. negative) of different types of correlations. At the end of the presentation there is a slide with some sentence frames for students to use when crafting their own sentences that describe scatter plots.

While the slides of correlation types are being shown students are filling in their vocabulary sheet (see attachment 1 - vocabulary sheet) with definitions of correlation and the different types of correlation. After the presentation is finished the teacher will instruct the students to complete the rest of the vocabulary sheet. This would include writing sentences using the provided sentence frames and drawing their own scatter plots that represent the academic vocabulary word.

While students are completing the vocabulary sheet the teacher can circulate the room to check in with students and formatively assess by questioning students and checking their written work. If there is time, the teacher can ask students to share some of their sentences with the class.

4. Student practice (10 min) -> teacher puts scatter plots from IISME lab work onto projector and students get mini-whiteboards to write one sentence that describes the scatter plots using the new vocabulary. The teacher asks students to hold up their whiteboards to quickly assess how each student is using the academic vocabulary. Sentences are shared outloud and recorded next to the corresponding graph. See attachment 3 - Sample Graphs

sample sentences could be:

- "When the temperature increased, the reaction time decreased showing a negative correlation"
- "The scatter plot comparing voltage to temperature showed a linear association except for one outlier point"
- "The scatter plot shows a weak nonlinear correlation in the data."

5. exit slip (5 min) -> at the end of the lesson students will be given a small scatter plot and will be asked to write at least two sentences on lined paper to describe the graph using the academic vocabulary learned in class. See attachment 5 - exit slip prompt

6. When students turn in their exit slip the teacher gives them a copy of the summative assessment (see attachment 6 - homework assignment). The summative assessment is a homework assignment that asks them to describe a few scatter plots using the vocabulary learned during the lesson. The teacher can use this assignment to assess student progress towards mastering the learning goal of the lesson.

## 2. Additional Instructional Context: (Optional)

*If you plan to teach this lesson within the context of a larger unit, feel free to provide an outline of this broader unit. You could include additional objectives, a schedule/outline of the other lessons accompanying the core lesson above and any supporting skills/tasks in which students may need to accomplish the lesson. **PLEASE NOTE: IISME staff will***

***assess the core lesson according to the rubric. The information included here will provide helpful context for the education audience but will not be assessed.***

**Additional Instructional Context:**

**3. Supply List: \* Required**

*Please list the core supplies and hand-outs that will be needed for your Implementation Plan. You only need to list the supplies/hand-outs for your core lesson.*

**Supply List:**

mini white board and markers  
sample scatter plots  
vocabulary worksheet  
projector and screen  
lined paper for exit slip

**4. Bibliography: \* Required**

*Please use MLA format to cite any outside lesson plans, images, Web sites, resources etc. you used to develop this ETP. **NOTE:** The following website will automatically generate correct MLA format for you: <http://citationmachine.net> For additional information on MLA please visit [MLA - Perdue University](#) [Click here](#) for example bibliographies.*

**Bibliography:**

"Types of Correlation." *Types of Correlation*. ditutor, n.d. Web. 6 Jul. 2015. .

"Scatter Plots." *Scatter (XY) Plots*. Math is Fun, n.d. Web. 6 July. 2015.

**5. Keywords: (Optional)**

*Enter up to **10** keywords/meta tags separated by commas, so it can be easily searched.*

**Keywords:**

Scatter plots, correlation, vocabulary

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## IV. Attachments

*Please list the names of all attachments accompanying this ETP and the links to your documents. (**note: All attachments should be uploaded to in your Google Drive and made "public"**)*

### **Attachments:**

[Vocab Instruction PowerPoint Slides](#)

[Guided Practice PowerPoint Slides](#)

[Homework Assignment](#)

[Exit Slip Prompt](#)