

Using Evidence

Worth up to 10 additional points for your current quarter grade, and an increase in your license to learn level.

****Important Notes:**

- **You are allowed to work with one additional student on this project. Each student will receive an identical grade for the final product.**
- **Your end of quarter grade cannot exceed 100%. Any remaining points from this and other extension projects will be moved to the following quarter.**
- **You will not be provided with any materials for this project.**

Goal of Extension Project: To determine the validity of a claim using evidence, gathered through scientific investigation.

Step #1 - Research and Selection:

Wait a minute, before we get into the nitty gritty... Do you even know why we are doing this extension project? No? Well, let me tell you about my reasoning... watch yourself, here comes the teaching hat!

So here it is, after all my years doing this science teacher gig I have determined that real science is the act of investigating a natural phenomenon, developing a claim that helps explain how the natural phenomenon happens, and then finally gathering evidence to help support your claim. So in a sense, this is the real deal, true science! I want you to leave science class this year with what I think is the most important skill ANY scientist must possess.

Select a Claim to investigate:

- A. Salt dissolves more readily into water at ANY temperature compared to white granulated sugar, baking soda, and baking powder.
- B. Any quantity of water heated to 32 degrees celsius will freeze faster than any quantity of water heated to 24, 18, or 15 degrees celsius.
- C. Five level tablespoons of dishwashing liquid and two teaspoons of white granulated sugar dissolved into 1 cup of 20 degree celsius water creates bubbles with the largest average diameter when compared to bubble solution made with 4, 3, 2, or 1 tablespoons of dishwashing liquid.

After reading through the three possible claims, select which one you would like to pursue. Circle the claim and in the space below explain why you think that this claim will be the most interesting to investigate:

Step #2 - Design:

Based upon the claim you have chosen, develop a fair experimental procedure to test the claim:

- Make sure the investigation allows for the collection of true, measurable, quantitative evidence.
- Make sure the investigation is fair in all accounts and no biases are made throughout the experiment.
- Make sure to develop a clear, step-by-step set of directions for the investigation, which could EASILY be replicated.
- Make sure there is access to ALL equipment and that the equipment is accurate.

Complete the information below to design your experimental procedure.

Problem to be solved:

Independent Variable to be tested:

Dependent Variable(s) to be measured:

Controlled Variable(s) throughout experiment (be specific):

Hypothesis:

Experimental Procedure (please number each step carefully):

Step #3 - Test:

Gather data/evidence from the experimental procedure:

- Gather ALL data in an organized fashion, using a table or chart to clearly organize all information.
- Use graphs and other visual methods to help make sense of the data.
- All data should include proper units of measure
- Multiple pieces of data should be collected and the overall procedure should be “data-rich”
- Along with data, qualitative evidence should be gathered throughout the entire procedure, including; sketches, photographs, observations, etc...

Determine the validity of the claim and use evidence to determine if the claim is **supported** or

unsupported:

- Using only the data collected from the experimental procedure, determine if the the claim is valid.
- Use the **evidence/data** to support the finalized determination of the validity of the claim.
- Determine if the claim is supported or unsupported. If necessary, develop a new claim based upon the evidence / data collected.

Step #4 - Communicate the project:

You **WILL NOT** use google slideshow to communicate your information. Those days are done. Let's use something that will reach more people and will insure that the quality of the work you are creating is above and beyond the norm. You have three options to communicate your project.

- One option is using **Youtube** to create a "build it" video with the purpose of instructing another person on how to conduct your experiment.
- Option two is to complete an **instructable** by signing up (via your WRSD account) for instructables at <https://www.instructables.com/account/register/> and linking your google account. You should familiarize yourself with the process of creating an instructable by exploring other people's instructables and seeing what makes a good one and what makes a bad one.
- The third option is to create a clear poster presentation to be hung up outside the classroom. Basically you are creating a paper version of an instructable.

No matter which option you choose, your form of communication must include the following:

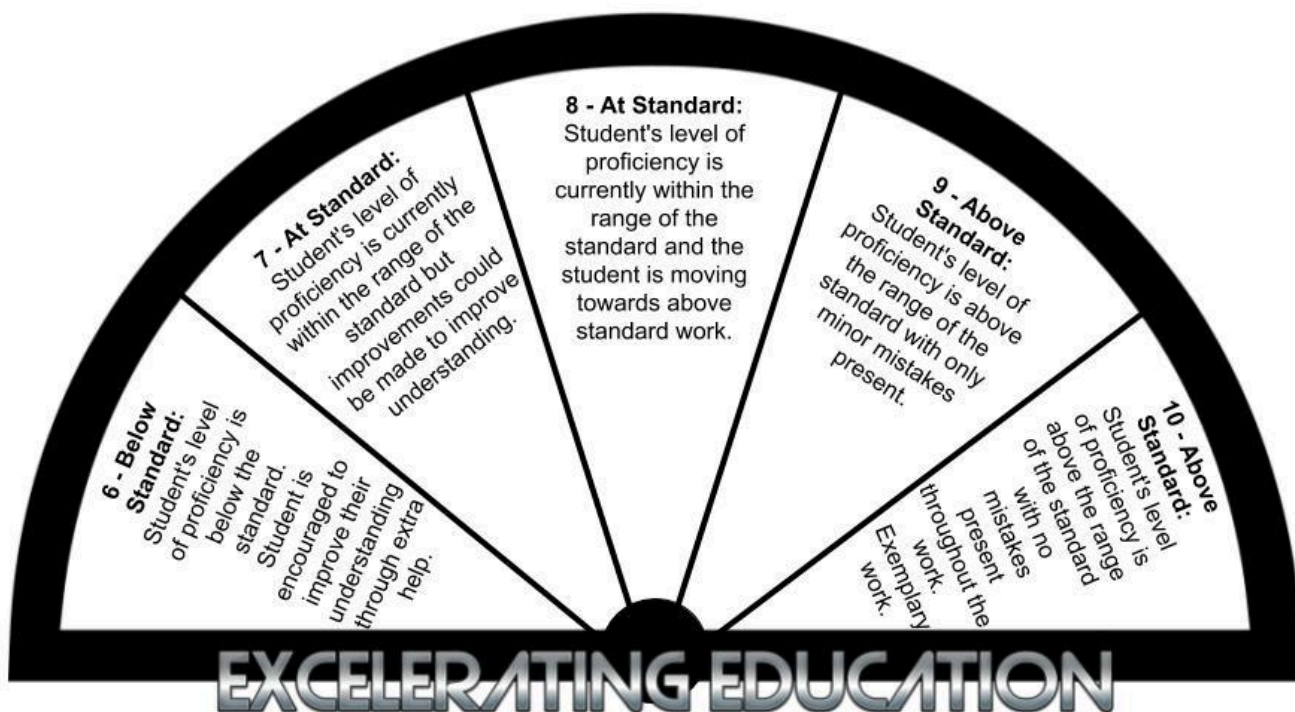
1. An introduction to your project and who you are. **Clearly state the goal of this project right at the start of your communication.**
2. Details about the problem you set out to solve.
3. Information (including photos and / or videos) about the creation of your experiment including:
 - a. Independent variable
 - b. Dependent variable
 - c. Controlled variables
 - d. Original hypothesis
 - e. Details about the experimental procedure
4. Information (including photos and / or videos) about the implementation of your experiment:
 - a. Materials, tools and skills necessary
 - b. Timeframe for the experiment
 - c. Problems and trouble spots encountered during the experiment
 - d. Changes made to the experiment during implementation
5. Information (including photos and / or videos) about the results of your experiment:
 - a. What evidence was gathered and what does it look like? (maybe show a graph)
 - b. What are the final conclusions you can make concerning this evidence... what does it mean?
 - c. Is the claim supported or unsupported!

Rubrics for different forms of communication:

Youtube Video Rubric

Did the communication include...

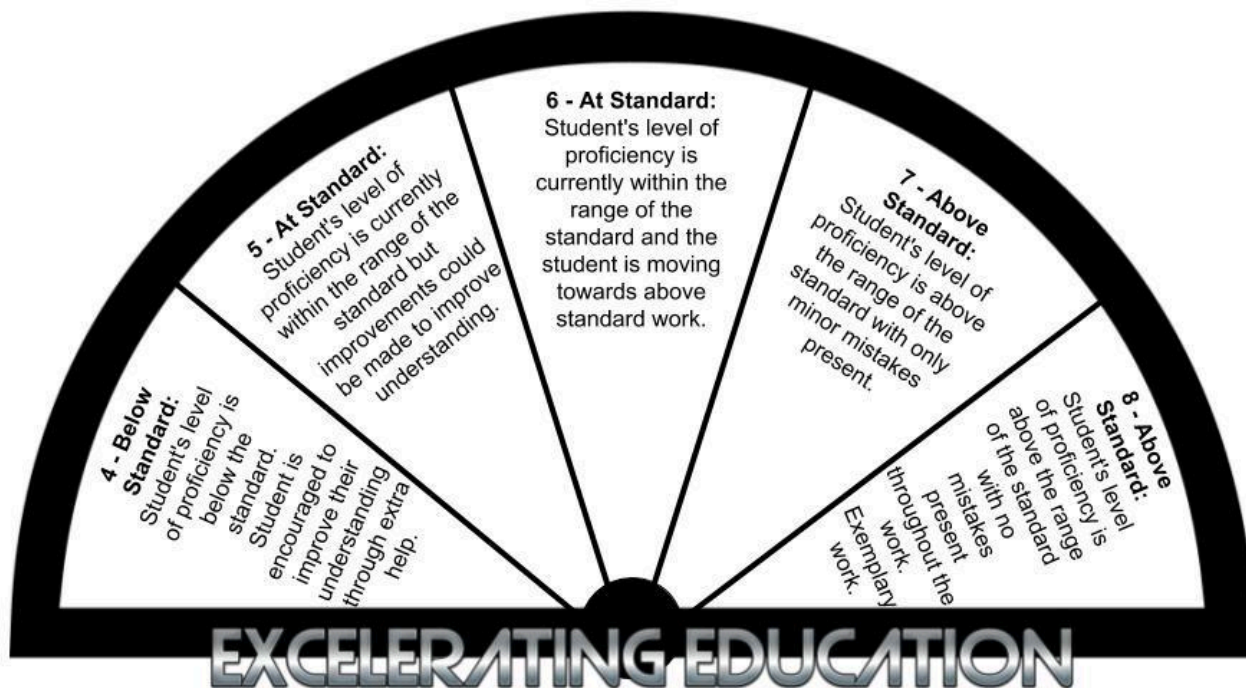
- ☐ An introduction to your project and who you are. **Clearly state the goal of this project right at the start of your communication.**
- ☐ Details about the problem you set out to solve.
- ☐ Information (including photos and / or videos) about the creation of your experiment including:
 - ☐ Independent variable
 - ☐ Dependent variable
 - ☐ Controlled variables
 - ☐ Original hypothesis
 - ☐ Details about the experimental procedure
- ☐ Information (including photos and / or videos) about the implementation of your experiment:
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 - ☐ What evidence was gathered and what does it look like? (maybe show a graph)
 - ☐ What are the final conclusions you can make concerning this evidence... what does it mean?
 - ☐ Is the claim supported or unsupported!



Instructable Rubric

Did the communication include...

- ☐ An introduction to your project and who you are. **Clearly state the goal of this project right at the start of your communication.**
- ☐ Details about the problem you set out to solve.
- ☐ Information (including photos and / or videos) about the creation of your experiment including:
 - ☐ Independent variable
 - ☐ Dependent variable
 - ☐ Controlled variables
 - ☐ Original hypothesis
 - ☐ Details about the experimental procedure
- ☐ Information (including photos and / or videos) about the implementation of your experiment:
 - ☐ Materials, tools and skills necessary
 - ☐ Timeframe for the experiment
 - ☐ Problems and trouble spots encountered during the experiment
 - ☐ Changes made to the experiment during implementation
- ☐ Information (including photos and / or videos) about the results of your experiment:
 - ☐ What evidence was gathered and what does it look like? (maybe show a graph)
 - ☐ What are the final conclusions you can make concerning this evidence... what does it mean?
 - ☐ Is the claim supported or unsupported!



Poster Rubric

Did the communication include...

- ☐ An introduction to your project and who you are. **Clearly state the goal of this project right at the start of your communication.**
- ☐ Details about the problem you set out to solve.
- ☐ Information (including photos and / or videos) about the creation of your experiment including:
 - ☐ Independent variable
 - ☐ Dependent variable
 - ☐ Controlled variables
 - ☐ Original hypothesis
 - ☐ Details about the experimental procedure
- ☐ Information (including photos and / or videos) about the implementation of your experiment:
 - ☐ Materials, tools and skills necessary
 - ☐ Timeframe for the experiment
 - ☐ Problems and trouble spots encountered during the experiment
 - ☐ Changes made to the experiment during implementation
- ☐ Information (including photos and / or videos) about the results of your experiment:
 - ☐ What evidence was gathered and what does it look like? (maybe show a graph)
 - ☐ What are the final conclusions you can make concerning this evidence... what does it mean?
 - ☐ Is the claim supported or unsupported!

