# Wisconsin Student Learning Objective (SLO) Plan

After reviewing data and identifying student population for whom SLO will apply, create Student Learning Objective. Submit SLO Plan to evaluator prior to Evaluation Planning Session.

<table>
<thead>
<tr>
<th>Name of Teacher</th>
<th>Name of Reviewer</th>
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</thead>
<tbody>
<tr>
<td>Grade 5 Teacher of Science</td>
<td>School Principal</td>
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<table>
<thead>
<tr>
<th>Content Area/Grade Level</th>
<th>Date Reviewed</th>
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<tbody>
<tr>
<td>Science and writing/Grade 5</td>
<td>TBD</td>
</tr>
<tr>
<td>Science content: FOSS Environments, Landforms, and Mixtures &amp; Solutions Writing in Science: Claim, Evidence, and Reasoning (NGSS practices 6 &amp; 7)</td>
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## Student Learning Objective (SLO):

Over the course of the school year, students will improve in their ability to write scientific explanations. Students’ ability to craft scientific explanations will increase by at least one level on the CERR rubric (see attached) for the categories of Claim, Evidence, and Reasoning. Students scoring proficient (scores of 2 in each category) at the beginning of the year will participate in opportunities for growth in the Rebuttal category and will advance at least one level.

### Baseline Data and Rationale: (Why did you choose this objective?)

- Students demonstrated a need to engage in constructing, communicating, and critiquing scientific explanations based on their performance on the scientific explanation writing sample (FOSS Water Response Sheet – Water Vapor) collected and scored early in the school year.
- Students covered the science content to complete the response sheet in grade 4.
- An emphasis on evidence and explanation is consistent with the framework for K-12 science education (NGSS) and connects to grade 5 skills in the CCSS.

### Learning Content: (What content will the SLO address?)

**CCSS ELA Fifth Grade Language Arts Learning Targets**
- RI 1-1 (I can use specific quotes from a text when drawing inferences and explaining what a text says specifically.)
- RI 1-10 (I can read and comprehend informational text appropriate for fifth grade.)
- W 4 (I can produce a piece of writing that is appropriate for fifth grade tasks, purposes, and audiences.)
- W 8 (I can use provided sources to find information, take notes on sources, and categorize my notes.)
- W 9b (I can use evidence from informational text to support analysis, reflection, and research in my writing.)

**NGSS Practices**

6: Constructing Explanations and Designing Solutions
- Construct an explanation of observed relationships.
- Use evidence to construct or support an explanation.
- Identify the evidence that supports particular points in an explanation.

7: Engaging in Argument from Evidence
- Construct and/or support an argument with evidence, data, and/or a model.
- Use data to evaluate claims about cause and effect.

### Student Population: (Who are you going to include in this objective?)

- All students in my classroom will show growth in their ability to craft scientific explanations by increasing at least one level on the CERR rubric for the categories of Claim, Evidence, and Reasoning.
- Students demonstrating proficiency on the initial scientific explanation writing assessment will have the opportunity to show growth of at least one level in the Rebuttal category on the CERR rubric.

### Interval: (How long will you focus on this objective?)

Full academic year – initial scientific explanation writing sample given in September or October, final scientific explanation writing sample will be given in May or June.

### Assessment/Evidence Source(s): (How will you measure the outcome of your objective?)

The CERR rubric taken from Supporting Grade 5-8 Students in Constructing Explanations in Science: The Claim, Evidence, and Reasoning Framework for Talk and Writing (see attached) will be used to score student science explanation writing samples.

Scoring of students’ science explanation writing samples will occur in September or October (initial) and in May or June (final).
- **Initial:** FOSS Water Response Sheet – Water Vapor (Question: Why did the puddle disappear so quickly?)
- **Final:** FOSS Environments Response Sheet – Salt of the Earth (Question: Why did this stream have fewer insects near the shore?)

As formative assessment, scoring of two other scientific explanations using the CERR rubric will occur at the completion of FOSS Landforms and Mixtures & Solutions modules.
Targeted Growth: What is your goal for student growth?
I will use a tiered growth strategy. Students' ability to craft scientific explanations will increase by at least one level on the CERR rubric for Claim, Evidence, and Reasoning. I also expect growth from students receiving a proficient score (a score of 2 for each category) on the initial assessment. While maintaining their proficiency, they will also show at least one level of growth for the Rebuttal category.

Strategies and Support (What methods or interventions will you use to support this objective?)

- Using an integrated approach to teaching science and literacy can support an academically diverse group of students.
- Students will have the opportunity to show their understanding of each of the components of a scientific explanation – claim, evidence, and reasoning by completing and discussing the probes created by Kirk Robbins. (Is it a Claim?, Is it Evidence?, and Is it a Scientific Explanation?) (see attached)
- Students will have the opportunity to grow in their ability to write scientific explanations by writing one for each of the following grade 5 FOSS modules: Environments, Landforms, and Solutions & Mixtures. Each module takes approximately 12 weeks to complete. The science explanations will be completed at the end of each module. The first and second are formative assessments, and the last is the summative assessment. The FOSS Water Response Sheet will be used as an initial assessment at the beginning of the school year. Although the FOSS response sheets don’t specifically ask students to write scientific explanations, I have modified them by providing a scientific question for each one. Students will use the Claims, Evidence and Reasoning = Quality Scientific Explanations sheet as a tool to write their scientific explanations to answer the questions. (see attached)
- FOSS Water Response Sheet – Water Vapor (Question: Why did the puddle disappear so quickly?), Student Sheet No. 11
- FOSS Mixtures & Solutions Response Sheet – Concentration (Question: Which solution is the most concentrated?), Student Sheet No. 13
- FOSS Landforms Response Sheet – Go With the Flow (Question: What changes were caused by the flooding?), Student Sheet No. 11
- FOSS Environments Response Sheet – Salt of the Earth (Question: Why did this stream have fewer insects near the shore?), Student Sheet No. 19

- Over the course of the school year, I will make connections to the students' everyday understandings and use the claim, evidence, and reasoning framework to support the students in developing stronger understandings of these ideas in science class as well as stronger science writing.

- I will use variations of the scientific explanation framework depending on the students' level of experience and comfort level with this type of science writing. Variation 1 focuses on simple patterns in data that allow for a claim to be generated and supported with one piece of evidence. Variation 2 includes a focus on multiple pieces of evidence. In Variation 3 students need to explain why their evidence supports their claim. Variation 4 includes the addition of the rebuttal. A rebuttal describes alternative explanations and provides counterevidence and counterreasoning for why the alternative is not appropriate.
Claims, Evidence and Reasoning = Quality Scientific Explanations

Big Question:

Claim: A scientific sentence that answers the "big" question

Reasoning/Science background: Describe the important science ideas or definitions you thought about to make your claim.

Evidence (data)

Evidence (data)

Evidence (data)

Scientific Explanation: I found (describe evidence). That supports my claim that ___________. Because of (scientific ideas you understand). [Write a complete paragraph]
**Base Rubric for Claim, Evidence, Reasoning, Rebuttal (CERR)**

*Taken From Supporting Grade 5-8 Students in Constructing Explanations in Science: The Claim, Evidence, and Reasoning Framework for Talk and Writing by Katherine McNeill and Joseph Krajcik (2012).*

<table>
<thead>
<tr>
<th>Component</th>
<th>Level 0</th>
<th>Level 1</th>
<th>Level 2</th>
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<tbody>
<tr>
<td><strong>Claim</strong></td>
<td>Does not make a claim, or makes an inaccurate claim.</td>
<td>Makes an accurate but incomplete claim.</td>
<td>Makes an accurate and complete claim.</td>
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<tr>
<td>A statement or conclusion that answers the question asked or the problem posed.</td>
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<tr>
<td><strong>Evidence</strong></td>
<td>Does not provide evidence, or only provides inappropriate evidence that does not support claim.</td>
<td>Provides appropriate, but insufficient evidence to support claim. May include some inappropriate evidence.</td>
<td>Provides appropriate and sufficient evidence to support claim.</td>
</tr>
<tr>
<td>Scientific data that supports the claim. The data needs to be appropriate and sufficient to support the claim.</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td><strong>Reasoning</strong></td>
<td>Does not provide reasoning, or only provides reasoning that does not link evidence to the claim.</td>
<td>Provides reasoning that links the claim and evidence. Repeats the evidence and/or includes some scientific principles, but not sufficient.</td>
<td>Provides reasoning that links evidence to claim. Includes appropriate and sufficient scientific principles.</td>
</tr>
<tr>
<td>A justification that connects the evidence to the claim. It shows why <em>data counts as evidence</em> by using appropriate and sufficient scientific principles.</td>
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<tr>
<td><strong>Rebuttal</strong></td>
<td>Does not recognize that an alternative explanation exists and does not provide a rebuttal or makes an inaccurate rebuttal.</td>
<td>Recognizes alternative explanations and provides appropriate but insufficient counter evidence and reasoning in making a rebuttal.</td>
<td>Recognizes alternative explanations and provides appropriate and sufficient counter evidence and reasoning when making rebuttals.</td>
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<tr>
<td>Recognizes and describes alternative explanations, and provides counter evidence and reasoning for why the alternative explanation is not appropriate.</td>
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Is it a CLAIM?

A class was answering the following science question.

**Question:** Are soap and fat the same substance?

The teacher asked the class to answer the question using a *Scientific Explanation*. Below are some statements from their explanations.

- Which of the following statements are CLAIMS?
- What feedback would you give each student to make the statement a claim or to improve the claim?

<table>
<thead>
<tr>
<th>Is it a CLAIM? Yes or No</th>
<th>STATEMENT</th>
<th>FEEDBACK</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes or No</td>
<td>Yes they are.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>I think soap and fat are different substances.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Fat and soap are the same thing.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>No.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Soap is different.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Fat is not the same thing.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Fat is yellowish but soap is white.</td>
<td></td>
</tr>
</tbody>
</table>

What is your definition of a CLAIM? What do you notice about the statements that ARE claims? How are they different than the statements that are NOT claims?
Is it a Claim?

Facilitation Notes

Purpose
The purpose of this assessment probe is to elicit learners' ideas about what constitutes a CLAIM in a scientific explanation. If these ideas are not uncovered they could prevent a learner from fully understanding the CER framework.

Explanations

<table>
<thead>
<tr>
<th>Is it a CLAIM? Yes or No</th>
<th>STATEMENT</th>
<th>Possible feedback</th>
</tr>
</thead>
<tbody>
<tr>
<td>No</td>
<td>Yes they are.</td>
<td>Be more specific. The claim should stand alone.</td>
</tr>
<tr>
<td></td>
<td>I think soap and fat are different substances.</td>
<td>Stands alone</td>
</tr>
<tr>
<td>Yes</td>
<td>Fat and soap are the same thing.</td>
<td>Not correct, but is in the form of a claim</td>
</tr>
<tr>
<td>No</td>
<td>No.</td>
<td>This is not a complete statement. The claim should stand alone.</td>
</tr>
<tr>
<td></td>
<td>Soap is different.</td>
<td>Be more specific, soap is different than ___</td>
</tr>
<tr>
<td>No</td>
<td>Fat is not the same thing.</td>
<td>Be more specific, soap is not the same as ___</td>
</tr>
<tr>
<td>No</td>
<td>Fat is yellowish but soap is white.</td>
<td>There is no claim. This looks like evidence to support a claim.</td>
</tr>
</tbody>
</table>

There could be some confusion about the 3rd statement since this is not a CORRECT claim, however it is written in the form of a claim. This probe is intended to uncover ideas about what constitutes a claim, not whether a claim is correct or incorrect.

Facilitation Considerations
This probe is a Formative Assessment Classroom Technique (FACT) called a Justified List. It begins with a statement about a concept. Examples that fit (or possibly do not fit) the statement are listed. Learners check off the items on the list and provide justification explaining their rule or reasons for their selections. This assessment probe can also be used to provide an opportunity for learners to engage in the ideas on the list and modify their thinking based on new evidence or research.

Misconceptions
Learners may have a variety of misconceptions regarding the term CLAIM and what is an adequate representation of a CLAIM. The examples in the probe represent a range of common attempts made when writing a CLAIM as part of a scientific explanation.

Administering the Probe
This probe is best used at the beginning of instruction on a CER framework OR just after some initial instruction. Learners should be encouraged to share their choices and thinking with a partner. The teacher should circulate around the room to observe the responses, and the conversation occurring between partners. Use this information to inform your ongoing instruction on the CER framework.

It is recommended to immediately use this probe to debrief as a whole class. Are students noticing what differentiates a claim from a non-claim? Do students have good feedback for the statements that are not CLAIMS?

References
Supporting Grade 5-8 Students in Constructing Explanations in Science, McNeill & Krajcik (2011) http://books.google.com/books/about/Supporting_Grade_5_8_Students_in_Constru.html?id=PzibwAACAAJ

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Based on the Formative Assessment Probe framework developed by Page Keeley in her Uncovering Student Ideas in Science series
Is it Evidence?

Which of the following are examples of EVIDENCE that you might use when making a Scientific Explanation?

- Personal opinions
- Text from a science article
- Background knowledge
- Personal experiences
- Data from a data table
- Observations that another student made
- Measurements
- A prediction
- Notes you took during class
- Something you saw in a movie
- An interview with an expert
- A hypothesis
- A chart or graph
- A photograph
- A drawing
- An observation you wrote in a notebook
- A model
- Results from an investigation you conducted

Describe your rule for something to be considered EVIDENCE...

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________
Is it a Scientific Explanation?

Facilitation Notes

Purpose
The purpose of this assessment probe is to elicit learners’ ideas about what constitutes EVIDENCE in a scientific explanation. If these ideas are not uncovered they could prevent a learner from fully understanding the CER framework.

Explanation
This probe is intended to uncover ideas about what constitutes EVIDENCE. This could be confusing to students as they also learn about evidence in other content areas. In English/Language Arts, EVIDENCE is typically Text-Based Evidence. In Social Studies, evidence can take many forms. The intent of this probe is to uncover how students are defining evidence. Are they confusing evidence as only data from a data table or text?

All of the items could be evidence except the following:
- Personal Opinions
- Background Knowledge (could be evidence if a student has factual knowledge)
- A Prediction
- Something you saw in a movie (could be evidence if the movie/video is providing factual information)
- Hypothesis (based on evidence but is not itself evidence)

Facilitation Considerations
This probe is a Formative Assessment Classroom Technique (FACT) called a Justified List. It begins with a statement about a concept. Examples that fit (or possibly do not fit) the statement are listed. Learners check off the items on the list and provide justification explaining their rule or reasons for their selections. This assessment probe can also be used to provide an opportunity for learners to engage in the ideas on the list and modify their thinking based on new evidence or research.

Misconceptions
Learners may have a variety of misconceptions regarding the term EVIDENCE and what is an adequate source of EVIDENCE. The examples in the probe represent a range of sources that students may consider when supporting a CLAIM with EVIDENCE as part of a scientific explanation.

Administrating the Probe
This probe is best used at the beginning of instruction on a CER framework OR just after some initial instruction. Learners should be encouraged to share their choices and thinking with a partner. The teacher should circulate around the room to observe the responses, and the conversation occurring between partners. Use this information to inform your ongoing instruction on the CER framework.

It is recommended to immediately use this probe to debrief as a whole class. What ideas do they have about EVIDENCE? What opportunities do you have to move students’ understanding of EVIDENCE forward during upcoming instruction?

References
Supporting Grade 5-8 Students in Constructing Explanations in Science, McNeill & Krajcik (2011)
http://books.google.com/books/about/Supporting_Gra de_5_8_Students_in_Constru.html?id=_PzIbwAACAAJ

Created by Kirk Robbins
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teachscience4all.wordpress.com

Based on the Formative Assessment Probe framework developed by Page Keeley in her Uncovering Student Ideas in Science series
Is it a Scientific Explanation?

A group of students were talking about Scientific Explanations. They each had a different idea about the definition of a Scientific Explanation. Which student do you most agree with?

**Katie:** I think a scientific explanation is a summary that uses evidence from text.

**Angel:** I think a scientific explanation is a story about what you observed or did in an experiment.

**Blake:** I think a scientific explanation is a presentation, like a science fair project.

**Jada:** I think a scientific explanation is an answer to a question that has a claim, evidence, and reasoning.

**Cori:** I think a scientific explanation is when you write a procedure for how to conduct an investigation.

I agree with __________________________. Explain why you picked this idea and why you did not pick the others.

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________
Is it a Claim?

Facilitation Notes

Purpose
The purpose of this assessment probe is to elicit learners' ideas about what constitutes a CLAIM in a scientific explanation. If these ideas are not uncovered they could prevent a learner from fully understanding the CER framework.

Explanation
Students may have some confusion about how a scientific explanation differs from an everyday explanation.

The best answer is JADA's- that a scientific explanation answers a question with a claim, evidence, and reasoning.

The other students' ideas represent possible misconceptions that students may have about scientific explanations.

Facilitation Considerations
This probe is a Formative Assessment Classroom Technique (FACT) called a Friendly Talk Probe. It begins with a scenario about a concept. Examples that fit (or possibly do not fit) the scenario are then listed via Student Talk. Learners pick the student idea that best matches their own and provide justification explaining their rule or reasons for their selection. This assessment probe can also be used to provide an opportunity for learners to engage in the ideas and modify their thinking based on new evidence or research.

Misconceptions
Learners may have a variety of misconceptions regarding what constitutes a scientific explanation. The examples in the probe represent a range of common ideas students may express when considering a scientific explanation.

Administering the Probe
This probe is best used at the beginning of instruction on a CER framework OR just after some initial instruction. Learners should be encouraged to share their choices and thinking with a partner. The teacher should circulate around the room to observe the responses, and the conversation occurring between partners. Use this information to inform your ongoing instruction on the CER framework.

It is recommended to immediately use this probe to debrief as a whole class. Are they noticing how a scientific explanation is different than other explanations? Do students have a broad or specific definition of a scientific explanation? How could you use this information to influence your upcoming instruction on how to write a scientific explanation?

References
Supporting Grade 5-8 Students in Constructing Explanations in Science, McNeill & Krajcik (2011) http://books.google.com/books/about/Supporting_Grade_5_8_Students_in_Construct.html?id=Pz1bwAACAAJ
RESPONSE SHEET—WATER VAPOR

A student helped his mother carry in groceries from the car on a warm, sunny day. On the way into their apartment, he noticed that a bottle of water was cracked and had left a puddle on the sidewalk. When he went back outside, he noticed that the puddle was gone. Later that evening he wrote this note in his journal.

That puddle of water was a real mystery! It was about 25 cm across. When I came back outside about 15 minutes later after helping Mom put the groceries away, the puddle was gone. I wonder if the neighbor’s cat drank the water. I hope they remember to put water in its bowl tonight.

Write a note to this student. Explain any ideas you have about why the puddle disappeared so quickly.
Allyson was very interested in the results of the investigations in the stream table. She had read about a flash flood on a river flowing through a steep canyon in Colorado several years ago. The flood caused quite a bit of damage to property and loss of lives. She wondered how she might set up an investigation in the stream table to find out what effect flooding would have on a stream with a steep slope.

What advice can you give her about setting up her investigation? How will she know what changes were caused by flooding?
RESPONSE SHEET—CONCENTRATION

In comparing three solutions Julie wrote in her journal that solution 3 was the most concentrated because it had the most water and the most salt. What can you tell Julie about concentration?

Solution 1
50 ml of water
2 spoons of salt

Solution 2
100 ml of water
4 spoons of salt

Solution 3
150 ml of water
5 spoons of salt
RESPONSE SHEET—SALT OF THE EARTH

Here is a chance for you to help scientists solve a problem. Mike and Mary are two scientists who travel up small streams that flow into the large Amazon River in South America. They study the plants and animals along the streams. As they travel upstream, they usually find that the number of insects around them increases. When they are near the headwaters where the streams begin, they expect to be surrounded by swarms of insects.

One day they traveled up a stream they had not been on before. As they got nearer to the source of the stream, the number of insects declined until there were almost none at the headwaters. The scientists were puzzled. List some ideas you have that might explain why this one stream had fewer insects near its source.