

Metaphorical Thinking: Scientific Method Unit

Sample of Beginning Levels of Mastery

Science Learning Target: While there are no direct learning targets that are connected to our metaphorical thinking work, these activities are connected directly to our school-wide focus on integrating literacy across the curriculum. The sixth grade team has chosen to focus on metaphorical thinking as our literacy activity.

Primary Indicator: Students have been making connections between objects in our curiosity box and the scientific method. This exemplar was completed by a group of students who studied a desktop ornament with a star supported by a spring.



Exemplar	Teacher Comments
<p>If we were going to do an experiment with this object, we could fling the spring that is holding up the star.</p> <p>The hardness of our fling would be the independent variable. The number of times that the spring went back and forth would be the dependent variable. The cube at the bottom would be the constant because it never changes.</p> <p>Then, we'd make a data table and share our results with other scientists.</p>	<ol style="list-style-type: none"><li data-bbox="824 909 1471 1010">1. The strength of this response is that the scientists have accurately used a bunch of vocabulary from our scientific method unit.<li data-bbox="824 1052 1471 1188">2. Unfortunately, the scientists haven't worked with metaphors at all. Instead, they've described a potential experiment that they could do WITH the object.<li data-bbox="824 1230 1471 1331">3. To improve this response, the scientists could tell us how each of the parts of the object are LIKE the vocabulary words that they are using.<li data-bbox="824 1373 1471 1509">4. For example, the cube really can be like constants because without constants, an experiment "collapses." Without the cube, this object would literally collapse.

Metaphorical Thinking: Scientific Method Unit

Sample of Developing Levels of Mastery

Science Learning Target: While there are no direct learning targets that are connected to our metaphorical thinking work, these activities are connected directly to our school-wide focus on integrating literacy across the curriculum. The sixth grade team has chosen to focus on metaphorical thinking as our literacy activity.

Primary Indicator: Students have been making connections between objects in our curiosity box and the scientific method. This exemplar was completed by a group of students who studied a popcorn box.



Exemplar

A popcorn box is like the scientific method because you have to fill it up with popcorn. That's like the results of an experiment.

The sides of the box are also rigid. Procedures in an experiment have to be rigid.

The lines on the box are like bar graphs because they are straight and neat. They are also spaced out evenly.

Teacher Comments

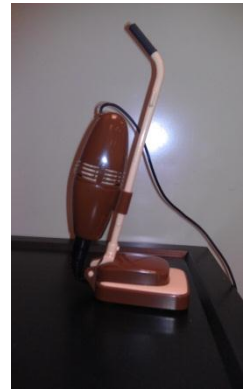
1. The strength of this response is that the scientists have done some inventive thinking. Scientists DO gather results in an experiment and moviegoers DO gather popcorn in boxes.
2. Unfortunately, the scientists haven't carried this single metaphor any further. Instead, they've jumped from topic to topic: Results, procedures, bar graphs.
3. The scientists make statements that they don't back up with details. For example, they haven't explained how "procedures are rigid."
4. The final connection—comparing the lines on the popcorn box to the lines on a bar graph—isn't inventive at all. It is a concrete (instead of metaphorical) connection.

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Sample of Mastering Levels of Mastery

Science Learning Target: While there are no direct learning targets that are connected to our metaphorical thinking work, these activities are connected directly to our school-wide focus on integrating literacy across the curriculum. The sixth grade team has chosen to focus on metaphorical thinking as our literacy activity.

Primary Indicator: Students have been making connections between objects in our curiosity box and the scientific method. This exemplar was completed by a group of students who studied a mini-vacuum cleaner.



Exemplar

A vacuum cleaner is designed to suck up stuff. That's kind of like the results of an experiment. Scientists are always running tests and recording what they are finding.

Sometimes when you use a vacuum cleaner, you have to run over the same spots several times before you suck things up. It doesn't always get everything on the first try. In a science experiment, you might not always conduct trials right the first time and you'll have to run them again to be sure that your results are reliable.

When you're done vacuuming, you can open up the vacuum and look at the contents of the container. Scientists often "open the contents" of their experiments by looking at their results before drawing their conclusions.

Teacher Comments

1. This response focuses on one topic throughout—running tests in an experiment—instead of jumping back and forth between different ideas.
2. This response uses word play to make metaphorical connections. “Opening the contents” becomes looking at results. “Sucking up stuff” is running tests to gather results.
3. This response makes inventive yet accurate connections. Running a vacuum over the same spot becomes running multiple tests in an experiment is really interesting.
4. This response includes extensive detailing, leaving readers convinced that the scientists are right.

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Science Learning Target: While there are no direct learning targets that are connected to our metaphorical thinking work, these activities are connected directly to our school-wide focus on integrating literacy across the curriculum. The sixth grade team has chosen to focus on metaphorical thinking as our literacy activity.

Primary Indicator: Students have been making connections between objects in our curiosity box and the scientific method. This exemplar was completed by a group of students who studied a fancy doll case.



Exemplar

Our doll case is like the conclusions of an experiment because it is smooth, neat and polished. A scientist has to make their conclusions smooth, neat and polished before other people will understand them.

Our doll case is also like the conclusions of an experiment because it is a container. Conclusions contain the most important things that a scientist has learned during an experiment.

Finally, a doll case can be carried and shared with and opened and explored by other people. Scientists always share their conclusions with other scientists. Those scientists "open" and "explore" the conclusions of others. They also try to run the same tests to see if they can repeat the results.

Teacher Comments

1. Like the Mastering example, this response focuses on one topic throughout—doll case as conclusions—instead of jumping back and forth between different ideas.
2. This response also uses word play to make metaphorical connections. Conclusions as “containers” is an interesting and engaging connection.
3. The trait that distinguishes this exemplar from the Mastering example is the scientists’ connection to a critical element of the scientific method: sharing results with other scientists. This demonstrates a deep understanding of the topic we are studying.
4. Another distinguishing characteristic of this exemplar is the scientists have successfully made connections between an unusual and unfamiliar object—which is far more challenging than making connections to objects that are common.