

Middle School

Student Learning Objective:

Comprehensive Science

Grade 8

Middle School Comprehensive Science Grade 8 Example

LEARNING GOAL

Directions for Establishing a Learning Goal: Use the planning information to refine and contextualize the description of the learning goal.

Learning Goal: a description of the specific knowledge and skills that support the enduring understandings or big ideas that students will possess at the end of the course or grade based on course- or grade-level content standards and curriculum.

Learning Goal for this SAO

Good

Students in grade 8 sciences will be able to provide a written essay in response to a conceptual writing prompt grounded in life science, physical science, and earth space science concepts using appropriate scientific vocabulary, stating a claim, and supporting their claim with evidence and scientific principles.

Explanation

The Learning Goal includes general knowledge and skills that students will learn (concepts related to life, physical, and earth space science) and how they will demonstrate their knowledge (responding to a writing prompt). **This Learning Goal would be strengthened by clearly articulating the specific expectations that students will know and demonstrate in each of the sciences. By reversing the order of the components of the Learning Goal this would become clearer. In addition it is unclear where the students will locate the necessary evidence.**

Students are expected to demonstrate their learning by integrating knowledge from different sources (although not clear what these sources are) through an essay. The students are expected to do this in different units of instruction in each of the sciences. This complex expectation is a rigorous year-long expectation in a science class. **This Learning Goal would be strengthened with the identification of the sources of information that students are expected to use in order to provide evidence in their essay.**

This Learning Goal is a “slice” of the curriculum that will extend beyond a unit as students will be engaged in learning and demonstrating the ability to learn the scientific concepts, engage in science investigations, read about concepts, as well as communicate the concepts in response to a prompt in an essay.

Better

Students in grade 8 sciences will be able to demonstrate conceptual knowledge related to matter and energy transformations in life science, properties and changes of matter in physical science, and the law of universal gravitation in earth space science in order to respond to a science prompt. The response will be in the form of a written informational C.E.R. (Claim-Evidence-Reasoning) essay using scientific principles and evidence from sources such as labs, articles, and the textbook, and will include a claim, appropriate scientific vocabulary, and appropriate organization.

LEARNING GOAL PLANNING QUESTIONS

Directions for Establishing a Learning Goal: After completing the entire table, use the planning information to write the description of the learning goal.

Learning Goal: a description of the specific knowledge and skills that support the enduring understandings or big ideas that students will possess at the end of the course or grade based on course- or grade-level content standards and curriculum.

Planning Information for Writing the Learning Goal

Good

Big Idea:

Use of science processes to state claims must be supported by empirical evidence.

Explanation

Identifies a big idea in science.

Better

{Nothing else is required.}

Good

Content Standards:

Nature of Science

SC.8.N.1.3: Use phrases such as “results supported” or “fail to support” in science, understanding that science does not offer conclusive ‘proof’ of a knowledge claim.

SC.8.N.1.6: Understand that scientific investigations involve the collection of relevant empirical evidence, the use of logical reasoning, and the application of imagination in devising hypotheses, predictions, explanations, and models to make sense of the collected evidence.

SC.8.N.2.1: Distinguish between scientific and pseudoscientific ideas.

SC.8.N.2.2: Discuss what characterizes science and its methods.

Specific writing prompts will address standards from strands SC.8.P.8, SC.8.P.9, SC.8.L.18, and SC.8.E.5

Explanation

The Nature of Science standards, which are critical when selecting evidence for the written essay, are included with the standard number and the wording to ensure that the standard aligns to the expectations of the Learning Goal. **Although the standard numbers for the sciences are included, they too should have the wording provided. Since this Learning Goal expects students to demonstrate the informational writing expectations, this standard should also be included.**

Better

Nature of Science (same as above)

Life Science

SC.8.L.18.1: Describe and investigate the process of photosynthesis, such as the roles of light, carbon dioxide, water and chlorophyll; production of food; release of oxygen.

SC.8.L.18.2: Describe and investigate how cellular respiration breaks down food to provide energy and releases carbon dioxide.

SC.8.L.18.4: Cite evidence that living systems follow the Laws of Conservation of Mass and Energy.

Physical Science

SC.8.P.8.2: Differentiate between weight and mass recognizing that weight is the amount of gravitational pull on an object and is distinct from, though proportional to, mass.

SC.8.P.8.3: Explore and describe the densities of various materials through measurement of their masses and volumes.

SC.8.P.8.4: Classify and compare substances on the basis of characteristic physical properties that can be demonstrated or measured; for example, density, thermal or electrical conductivity, solubility, magnetic properties, melting and boiling points, and know that these properties are independent of the amount of the sample.

SC.8.P.8.8: Identify basic examples of and compare and classify the properties of compounds, including acids, bases, and salts.

SC.8.P.8.9: Distinguish among mixtures (including solutions) and pure substances.

Earth Space Science

SC.8.E.5.7: Compare and contrast the properties of objects in the Solar System including the Sun, planets, and moons to those of Earth, such as gravitational force, distance from the Sun, speed, movement, temperature, and atmospheric conditions

SC.8.E.5.8: Compare various historical models of the Solar System, including geocentric and heliocentric

SC.8.E.5.9: Explain the impact of objects in space on each other including:

1. the Sun on the Earth including seasons and gravitational attraction
2. the Moon on the Earth, including phases, tides, and eclipses, and the relative position of each body.

SC.8.E.5.10: Assess how technology is essential to science for such purposes as access to outer space and other remote locations, sample collection, measurement, data collection and storage, computation, and communication of information.

SC.8.E.5.12: Summarize the effects of space exploration on the economy and culture of Florida.

LAFS.8.W.1.2: Write informative/explanatory texts to examine a topic and convey ideas, concepts, and information through the selection, organization, and analysis of relevant content.

- a. Introduce a topic clearly, previewing what is to follow; organize ideas, concepts, and information into broader categories; include formatting (e.g., headings), graphics (e.g., charts, tables), and multimedia when useful to aiding comprehension.
- b. Develop the topic with relevant, well-chosen facts, definitions, concrete details, quotations, or other information and examples.

- c. Use appropriate and varied transitions to create cohesion and clarify the relationships among ideas and concepts.
- d. Use precise language and domain-specific vocabulary to inform about or explain the topic.
- e. Establish and maintain a formal style.
- f. Provide a concluding statement or section that follows from and supports the information or explanation presented.

Good

Important and Meaningful:

In order for students to fully understand science concepts, they need to be able to provide explanations of the concepts and use evidence to justify their explanations. Being able to discuss these concepts demonstrates a deeper level of understanding.

Explanation

This statement is true for all students and supports the big idea. **What is required here is for an explanation as to why this Learning Goal was selected for the teacher's students. Referencing a need based on school, district, or even past history of the teacher would strengthen the explanation as to why the Learning Goal is important and meaningful.**

Better

Students enjoy the hands-on aspect of science but struggle with being able to articulate their conceptual understanding in writing. Additionally, based on FSA writing scores, our school improvement team has determined that an area of focus is on writing using multiple sources. Consequently, this Learning Goal is important and meaningful as it will provide a planned purposeful opportunity for students to be able to demonstrate a deeper understanding of science concepts through writing using multiple data sources.

Good

Deep Understanding:

The learning goal requires students to explain science concepts by explaining, generalizing, and connecting ideas using supporting evidence from multiple science sources. This explanation is through a multi-paragraph written response that includes the informational writing criteria. This Learning Goal is at a DOK level 3.

Explanation

This Learning Goal does represent a DOK Level 3 expectation. The explanation provides details that support this level of cognitive rigor.

Better

{Nothing else is required.}

Good

Instruction:

1. Each week we have an essential question to explore in class through labs, readings, investigations, etc. At the end of the week, students will provide a written answer to the question, using these experiences as evidence.

2. I will begin with modeling and graphic organizers to guide student thought processes and help students to stay organized. Using a gradual release method, I will work with students, until their writing is independent.
3. A rubric will be provided with clear expectations outlined.

Explanation

A broad description of the instructional process the teacher will use is included. Some specific tools and strategies are included (graphic organizers, modeling, gradual release). **The first item appears to explain the general structure of the course and what students are expected to do at the end of each week. It is unclear what the teacher will do during this process. It is unclear how the teacher will use the rubric as part of the instructional process. This section is intended to provide a description of the strategies that the teacher will use to instruct students, not a description of what students are expected to do.**

Better

1. I will provide students will multiple opportunities to explore the science concepts through a variety of methods, such as hands-on activities and labs, researching and reading articles, and group projects. During these opportunities I will model expectations in labs, provide small group instruction for students struggling with locating and reading articles, and facilitating and supporting group projects.
2. I will begin the writing process by modeling and using a think aloud strategy with the use of graphic organizers to guide students' thought processes and to help students to stay organized and focused on the expectations. Using a gradual release method, I will work with students in small groups or one-on-one, until their ability to extract information and demonstrate the science concepts through writing are independent.
3. A rubric will be provided with clear expectations outlined. The rubric will be used to model what a high level C.E.R. writing looks like. Students will also have access to the rubric each time they are writing so they can use it as a checklist to self-assess their written response to the prompt.

Good

Time Span:

One to two class periods (45 minutes) per week for the entire school year.

Explanation

The Learning Goal is complex as it integrates the learning of science concepts and writing and will, therefore, require significant amounts of time. However, it is a "slice" of the curriculum and students will be engaged in science labs and learning additional science standards. Although this Learning Goal is clearly a significant expectation, the amount of time identified appears to be appropriate for the writing aspect.

Better

{Nothing else is required.}

Good

Appropriate and Sufficient:

The science concepts will be covered daily in class. This learning goal deals specifically with discussing these concepts in-depth, through student writing. Writing instruction on a weekly basis, after students

learn specific concepts, is sufficient time for learning the goal and by the end of the year, students will know how to write about science concepts using multiple sources.

Explanation

The statement provided clarifies how the time will be used throughout the school year.

Better

{Nothing else is required.}

ASSESSMENTS AND SCORING

Directions for Documenting Assessments and Scoring: Use the planning information to refine and tailor the description and use of assessments you described.

Assessments and Scoring: Assessments should be of high quality and designed to best measure the knowledge and skills found in the learning goal of this SAO. The assessment should be accompanied by clear criteria or rubrics to describe what students have learned.

Assessments for this SAO

Good

Summative assessments- Students will be given a prompt that focuses on the science concepts from the unit of study that requires students to provide a written informational essay that includes stating a claim (answer), providing evidence (data from labs, readings, class notes, etc.) and reasoning (stating a scientific principle that shows how their evidence supports their claim). Students will be expected to demonstrate appropriate scientific vocabulary and appropriate organization of their essay.

Example prompt: How can physical properties be used to classify and compare substances?

Formative assessments- Graphic organizers along with note strategies to help organize their writing and break down the C.E.R. process, bell ringer discussions focused on previous day's concepts, daily exit slips, lab reports, vocabulary foldables and interactive word wall notebook templates.

Explanation

The description and example summative assessment aligns to the expectations of the Learning Goal in which students are expected to respond to a science prompt requiring a written informational essay using scientific principles and evidence from sources such as labs, articles, and the textbook, and includes a claim, appropriate scientific vocabulary, and appropriate organization. **Within the prompt, the specific criteria that will be scored should be clearly identified.**

The formative assessments identified are appropriate examples.

Better

Summative assessments- Students will be given a prompt that focuses on the science concepts from the unit of study that requires students to provide a written informational essay that includes stating a claim (answer), providing evidence (data from labs, readings, class notes, etc.) and reasoning (stating a scientific principle that shows how their evidence supports their claim). Students will be expected to demonstrate appropriate scientific vocabulary and appropriate organization of their essay.

Example prompt: How can physical properties be used to classify and compare substances?

Be sure to:

- write a multi-paragraph essay that includes a Claim, Evidence from multiple sources, and Reasoning (C.E.R.)
- organize your essay to include 1) a clear introduction that introduces the topic and provides a preview of what is to follow, 2) thorough development with relevant, well-chosen facts, definitions,

concrete details, quotations, or other information and examples, and 3) a concluding statement or section that follows from and supports the information or explanation presented.

Formative assessments: {Nothing else is required}

Good

Defining and Scoring Performance:

Summative assessments:

Students will be scored using a 0-4 analytic rubric, which includes five criteria: 1) stating a scientifically accurate claim, 2) providing appropriate scientific evidence which supports the claim, 3) providing reasoning that justifies the link between the claim and evidence, 4) utilizing appropriate scientific vocabulary, and 5) clear focus and organization of the rubric.

The full rubric will be provided during the beginning of the year SAO conference for review.

Explanation

The explanation illustrates that the scoring tool is a rubric with four levels and criteria that align to the expectations of the Learning Goal. **Although this is probably a fairly common scoring rubric for science C.E.R. prompts, it would be beneficial to provide an example of the descriptors to illustrate how the quality of student work is defined, the distinction of the levels, and the progressive nature of the levels.**

The purpose of formative assessments is to make instructional decisions based on students' misconceptions, misunderstandings, or ability to apply their learning and to subsequently make immediate instructional adjustments. Therefore, it is not necessary to provide information on defining and scoring formative assessment performance.

Better

Summative assessments:

Students will be scored using a 0-4 analytic rubric, which includes five criteria: 1) stating a scientifically accurate claim, 2) providing appropriate scientific evidence which supports the claim, 3) providing reasoning that justifies the link between the claim and evidence, 4) utilizing appropriate scientific vocabulary, and 5) clear focus and organization of the rubric.

Below is an example of the Evidence criteria.

Evidence – scientific data that supports the claim

Level 4:

- The data are scientifically appropriate to support the claim
- The data are thorough and convincing-enough details and evidence provided
- Proper units are used in data
- Shows with evidence why alternate claims do not work

Level 3:

- The data are scientifically appropriate to support the claim

- The data are basically sufficient and convincing, but tend to be more general and not specific and in-depth
- Does not address why alternate claims do not work
- Evidence may be repetitive

Level 2:

- The data relate to the claim, but are not entirely scientifically appropriate
- The data are not sufficient, though generally support the claim

Level 1:

- There is some evidence provided, but it is not logically linked to the claim or scientifically appropriate

The full rubric will be provided during the beginning of the year SAO conference for review.

ASSESSMENTS AND SCORING PLANNING QUESTIONS

Directions for Documenting Assessments and Scoring: After completing the entire table of planning questions, use the planning information to write the description and use of assessments and scoring criteria or rubrics.

Assessments and Scoring: Assessments should be of high quality and designed to best measure the knowledge and skills found in the learning goal of this SAO. The assessment should be accompanied by clear criteria or rubrics to describe what students have learned.

Planning Information for Explaining the Use of Assessments and Scoring

Good

Collecting summative and formative data:

Students will complete at least one C.E.R. essay each quarter, which will serve as the summative assessment. A total of 4 C.E.R. essays will be completed throughout the year.

Formative data will be collected daily to ensure students understand the science concepts and writing skills

Explanation

The response identifies an appropriate period of time for the collection of four summative assessments. The formative is collected more often and includes both science and writing concepts.

Better

{Nothing else is required}

Good

Use of Information:

The formative assessments will serve to identify students' misconceptions, misunderstandings, and which concepts are understood in both science and writing. Concepts that are causing students to struggle will be retaught in a whole group, small group, or individually, depending on the number of students struggling.

The summative assessments will document progress as students learn to put their understanding of these concepts in writing, and will serve to guide my instruction towards the learning goal.

Explanation

A description of the purpose and use of both the summative and formative data and information collected is provided. The description of the leveled student groups seems to focus on students in need of remediation. This description would be strengthened if information were provided on how the information will be used for both students in need of remediation and enrichment were provided.

Better

The formative assessments will serve to identify students' misconceptions, misunderstandings, and which concepts are understood in both science and writing. Concepts that are causing students to struggle will be retaught in a whole group, small group, or individually, depending on the number of students struggling. Students who are grasping concepts readily and applying them consistently will be provided with opportunities to explore self-generated conceptual questions. Students will be able to present their findings through an outcome of their choosing, and must include a claim, evidence, and reasoning.

TARGETS

Directions for Establishing Targets: Use the planning information to guide how you will use previous performance to set baseline data as well as to establish expected targets.

Targets: identify the expected outcomes by the end of the instructional period for the whole class as well as for different subgroups, as appropriate.

Actual Performance from Baseline Data

Good

Baseline Data Sources:

1. Sample question prompt to assess students' ability to answer conceptual science questions in writing and follow the C.E.R. process.
2. Skills assessment of 7th grade science concepts, this assessment will be a 5 question survey of basic concepts covered in the 7th grade science curriculum.
3. Skills assessment of general nature of science concepts- this assessment will be multiple-choice in format and modeled after the state science assessment students are given in 8th grade.

Explanation

The baseline data included for establishing starting levels provides an overall understanding of students' knowledge of the pre-requisite science concepts, current nature of science concepts, and writing using the C.E.R. process.

Better

{Nothing else is required}

Good

Target Levels Established:

Four target levels have been established for this class with the following performance outcomes expected by the end of the year:

Expectations Exceeded: Students in this level consistently demonstrate the science concepts learned in the unit and are able to fully explain these concepts in an essay response to a prompt. The essay consistently includes the success criteria included on the rubric.

Expectations Met: Students in this level demonstrate the science concepts learned in the unit and are able to explain these concepts in an essay response to a prompt with minimal intervention and support. The essay includes the success criteria included on the rubric.

Expectations Partially Met: Students in this level struggle with demonstrating the science concepts learned in the unit and explaining these concepts in an essay response to a prompt. Intervention and support is required on a regular basis. The essay includes the some success criteria included on the rubric.

Expectations Not Met: Students in this level require extensive scaffolding and support to demonstrate the science concepts learned in the unit and to explain these concepts in an essay response to a prompt. Significant intervention and support is required on a regular basis. The essay includes the minimal success criteria included on the rubric.

Explanation

This explanation includes the performance levels and an explanation of what students in each group are able to do. **Since the rubric is mentioned, one addition to these explanations would be to add the end of year outcome data for each target level.**

Better

Four target levels have been established for this class with the following performance outcomes expected by the end of the year:

Expectations Exceeded: Students in this level consistently demonstrate the science concepts learned in the unit and are able to fully explain these concepts in an essay response to a prompt. The essay consistently includes the success criteria included on the rubric. Students should be consistently receiving 4s and 3s in all four criteria on the C.E.R. rubric.

Expectations Met: Students in this level demonstrate the science concepts learned in the unit and are able to explain these concepts in an essay response to a prompt with minimal intervention and support. The essay includes the success criteria included on the rubric. Students should be consistently receiving 3s in all four criteria on the C.E.R. rubric.

Expectations Partially Met: Students in this level struggle with demonstrating the science concepts learned in the unit and explaining these concepts in an essay response to a prompt. Intervention and support is required on a regular basis. The essay includes the some success criteria included on the rubric. Students should be consistently receiving 3s and 2s in all four criteria on the C.E.R. rubric.

Expectations Not Met: Students in this level require extensive scaffolding and support to demonstrate the science concepts learned in the unit and to explain these concepts in an essay response to a prompt. Significant intervention and support is required on a regular basis. The essay includes the minimal success criteria included on the rubric. Students should be consistently receiving 1s and 2s in all three criteria on the C.E.R. rubric.

Targets: identify the expected outcomes by the end of the instructional period for the whole class as well as for different subgroups, as appropriate.

Groups and Targets – students should be sorted into the levels identified below based on the Target Level set for the student. For example, a student may have a baseline level of ‘Approaching Expectations’ and a target level of ‘Exceeding Expectations’ has been set for that student. This student’s information should be recorded in the “Exceeding Expectations” level. After the Final Level has been identified, teachers should identify whether each student met or exceeded their target = Yes OR did not meet their target = **No.**

Student Names	Baseline Level	Target Level	Final Level	Outcome (Yes-met or exceeded target No-did not meet target)
High Level				
A	Met	Exceeded		
B	Met	Exceeded		
C	Partially Met	Exceeded		
D	Partially Met	Exceeded		
E	Partially Met	Exceeded		
F	Partially Met	Exceeded		
Average Level				
G	Met	Met		
H	Partially Met	Met		
I	Partially Met	Met		
J	Partially Met	Met		
K	Partially Met	Met		
L	Partially Met	Met		
M	Partially Met	Met		
N	Partially Met	Met		
O	Partially Met	Met		
P	Partially Met	Met		
Low Level				
Q	Not Met	Partially Met		
R	Not Met	Partially Met		

Below Level				

TARGETS PLANNING QUESTIONS

Directions for Establishing Targets: Use the planning information to guide how you will use previous performance to set baseline data as well as to establish expected targets.

Targets: identify the expected outcomes by the end of the instructional period for the whole class as well as for different subgroups, as appropriate.

Planning Information for Writing the Target Used to Define Teacher Performance

Good

Criteria for Baseline Levels:

- Sample question prompt revealed students' ability to develop a claim, locate evidence, demonstrate reasoning, and to organize their writing.
- Skills assessment of 7th grade science concepts, although only 5 questions, this assessment revealed how much content information was retained from the previous year.
- Skills assessment of general nature of science concepts revealed students' general understanding of how science works.

Explanation

Each assessment is identified and an explanation of the information provided from each assessment is included. **The explanation does not include how the specific criteria from each assessment were used for placing students at the different starting levels. Additionally, the explanation does not demonstrate how all of the data sources were used in conjunction with each other.**

Better

Sample question prompt revealed students' ability to develop a claim, locate evidence, demonstrate reasoning, and to organize their writing. The C.E.R. rubric was used to determine initial scores.

For this assessment:

- When the student baseline data showed a majority of 3's and 4's for all criteria he/she was determined to be in the Exceeded baseline level.
- When the student baseline data showed a combination of 3's and 2's for all criteria he/she was determined to be in the Met baseline level.
- When the student baseline data showed a majority of 2's for all criteria he/she was determined to be in the Partially Met baseline level.
- When the student baseline data showed a majority of 1's for all criteria he/she was determined to be in the Not Met baseline level.

Skills assessment of 7th grade science concepts, although only 5 questions, this assessment revealed how much content information was retained from the previous year.

Skills assessment of general nature of science concepts revealed students' general understanding of how science works.

- Since there were only 5 questions on each assessment, they were used to make determinations if a student was borderline between two levels.

Good

Setting Target Levels:

Most students demonstrated the qualities of the Partially Met level, no students demonstrated the qualities of the Exceeds level, three students demonstrated the qualities of the Met level, and two students are in the Not Met level. All students should be able to demonstrate the qualities of a higher level except for one student.

Explanation

The explanation provided identifies that all except for one student will be able to demonstrate improved achievement by the end of the year. The explanation refers to the qualities described based on the C.E.R. analytic rubric which was used to establish the baseline level. **The intention of this part of the planning section is to explain how students were placed in their target level. The explanation would be strengthened with the identification of specific behaviors students would exhibit that indicate how the target level was established and what would be expected of students in each level by the end of the school year.**

Better

Most students should be able to demonstrate growth by at least one level. Only one student met the criteria for remaining in the same target level as the starting level.

- When the various baseline data sources revealed mostly accurate knowledge of the C.E.R. writing criteria and more than half of the science content, he/she was determined to be in the Exceeds target level.
- When the various baseline data sources showed a student's ability to demonstrate some accurate knowledge of the C.E.R. writing criteria and half of the science content, he/she was determined to be in the Met target level.
- When the various baseline data sources showed a student's ability demonstrate minimal accurate knowledge of the C.E.R. writing criteria and less than half of the science content, he/she was determined to be in the Partially Met target level.
- When the various baseline data sources showed student's ability demonstrate inaccurate knowledge of the C.E.R. writing criteria and one or two of the science content, he/she was determined to be in the Not Met target level.

Good

Ambitious and Realistic:

The students that I have targeted for the Exceeds target level can already demonstrate a basic level of understanding of the C.E.R. process and most scored a 2 or 3 in the claim portion of the rubric. I feel that answering the question is the most challenging part of the C.E.R., and if they are already capable of this, I can provide adequate instruction in helping them learn to incorporate the other areas into their writings.

This class is starting with a large number of the students in the Low category. This group of students missed a great deal of science last year due to the excessive absences of their science teacher. Therefore, I expected them to score low on their baseline assessments. However, I have already seen some positive changes and know there is a great deal of potential with this class. I feel that with consistency and structure, they can be moved and make tremendous strides.

Explanation

Based on the explanation provided above, the targets set for students are appropriate.

Better

- {Nothing else is required}