Rubrics for Examining Deeper Learning in Middle School Science Activities & Student Work

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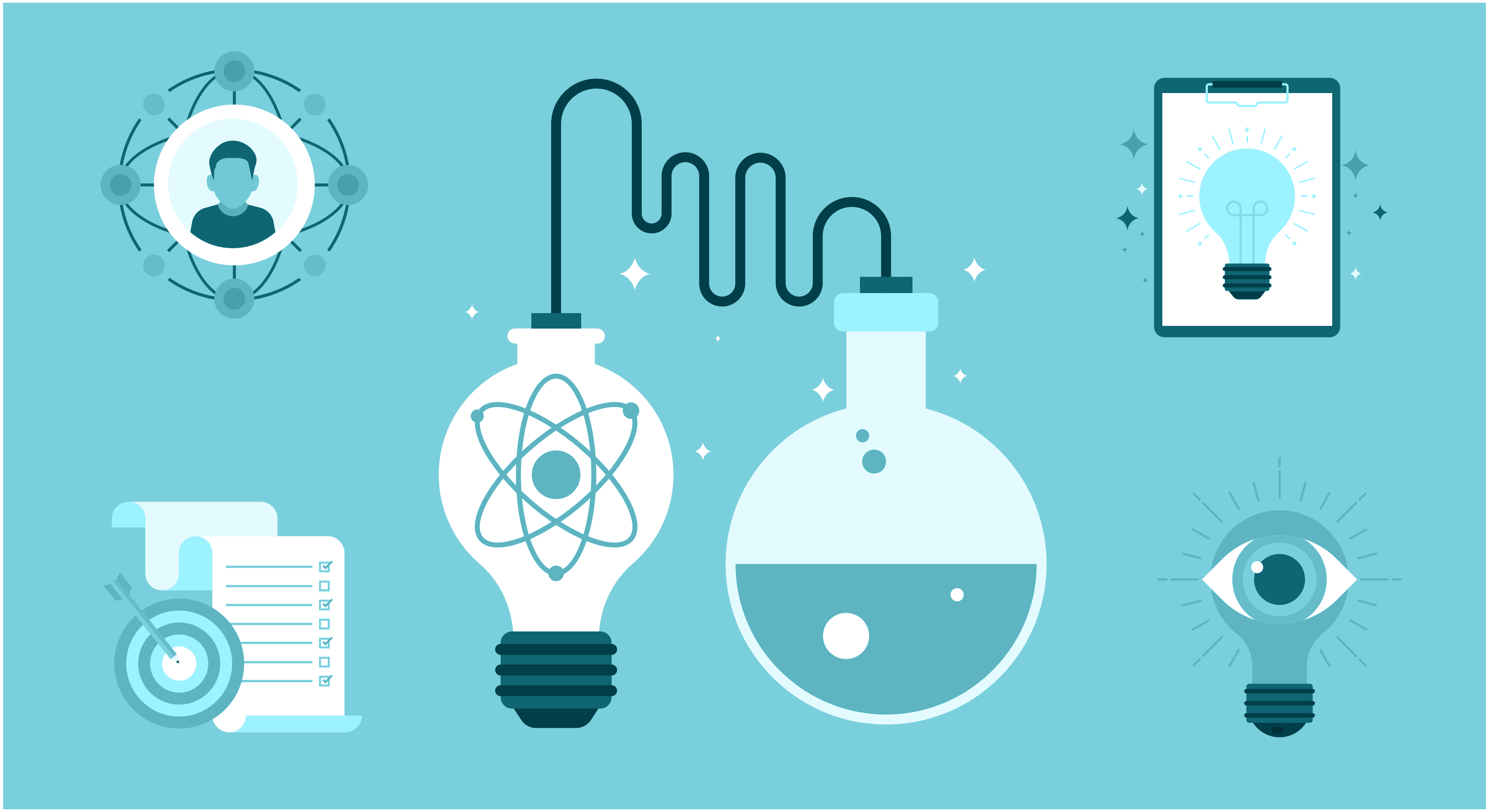

Digital Promise
Accelerating Innovation in Education

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Introduction

The Rubrics for Examining Deeper Learning in Middle School Science Activities and Student Work (Digital Promise, 2020) were developed in conjunction with the study of Digital Promise's Science Challenge Learning Project, funded by the William and Flora Hewlett Foundation, described in Iwatani, Means, Romero & Vang (2020). **The rubrics can be used by education researchers, curriculum developers, teachers and professional learning experts** to study the extent to which middle school science activities[1] exhibit deeper learning[2] opportunities, and the extent to which associated student work provides evidence towards students actually learning deeply.

The activity dimensions (A1 - A6) can be used to assess the extent to which a learning activity calls for students to:

- Engage with real-world concerns or problems that connect with their interests and values (A1)
- Guide their own learning of science or engineering (A2)
- Discover science principles or effective engineering designs (A3)
- Integrate information gleaned from secondary sources into scientific explanations or engineering solutions (A4)
- Collaborate substantively (A5)
- Organize, style, and format their communication effectively (A6)

The student work dimensions (S1 - S5) can be used to assess the extent to which student work provides evidence that student(s):

- Did/created something that addresses a real-world problem or concern (S1)
- Learned through practicing science (investigating, evaluating, developing explanations) (S2)
- Made sound use of the engineering design process (i.e., define, develop solutions, optimize) (S3)
- Critically integrates existing information into science explanations or engineering solutions (S4)
- Organized, styled, and formatted their work effectively (S5)

[1] Activities as enacted (rather than as planned).

[2] "[A]n umbrella term for the skills and knowledge that students must possess to succeed in 21st century jobs and civic life. At its heart is a set of competencies students must master in order to develop a keen understanding of academic content and apply their knowledge to problems in the classroom and on the job" (Hewlett, 2013).

By scoring the activities and examples of student work, **it's possible to answer questions like:**

- Does this middle school science/engineering learning activity provide opportunities for deeper learning? In what ways, and in what ways not?
- Did middle school students who participated in science/engineering learning activity actually learn deeply? In what ways, and in what ways not?
- What are ways to improve middle school science/engineering lessons so that students have opportunities to learn more deeply?
- Do students in fact learn more deeply when science/engineering learning activities provide deeper learning opportunities?

Each dimension has five levels (0-4) where generally 0 indicates **absence** of the deeper learning opportunity or outcome, 1 indicates **emergence**, 2 indicates **partial presence**, 3 indicates **solid presence**, and 4 indicates a presence that **exceeds expectations** of middle school learning opportunities and outcomes.

Please note:

- **The rubrics are not designed for everyday grading of students' work**, in part because the language and concepts used would be too hard for most middle school students to understand.
- **It's OK (and sometimes better) to use only a subset of dimensions of the rubric.** For example, if one's primarily interested in improving opportunities for student self-direction in science, it could be reasonable to focus only on A2. If engineering design is a focus, it could be reasonable to focus only on A2, A3, and S3.
- **It's OK (and sometimes better) to ignore level 4.** As mentioned, "4" is intended to indicate what would exceed expectations in terms of middle school learning opportunities and outcomes. This level was included only as a heuristic guide.
- **It's not expected for all activities and student work to score high on all dimensions.** Different activities have different purposes — not all activities are geared towards deeper learning in engineering design, for example. So it's neither expected nor realistic for every activity to score high on all dimensions.
- **But, (we think) it's important for middle school students to have opportunities to learn and grow in each of the ways that are described in the rubric.** The rubric went through an extensive design process (described in Iwatani, Vang, Romero & Means, forthcoming), including consideration of alignment with the Next Generation Science Standards and careful review by teachers and researchers to make sure that the dimensions are relevant to middle school teaching and learning.

One recommended use of this rubric is for professional learning. Teachers can bring in their activities and a few examples of student work, and use the rubric(s) as a guide to discuss what they observe and possible next steps for students and/or the activity.

A1. Activity calls for students to engage with **real-world concerns or problems that connect with their interests and values.**

0	1	2	3	4
Activity doesn't involve real-world concerns or problems (e.g., students learn facts or a theory in a decontextualized way).	Activity **involves a** real-world concern or problem. **It doesn't call for students to invest significant time, emotion, or thinking towards it.**	Activity involves a real-world concern or problem. **It calls for students to invest significant time and thinking** towards it. **It doesn't attempt to engage students emotionally.**	Activity involves a real-world concern or problem. It calls for students to invest significant time and thinking towards it. **It attempts to engage students emotionally by connecting with their interests and values.**	Activity involves a real-world concern or problem. It calls for students to invest significant time and thinking towards it. It attempts to engage students emotionally by connecting with their interests and values. **Activity intends to expand students' awareness and change the way they think, feel, or act.**
Examples: Activity asks students to explain the stages of the engineering design process. Activity asks students to learn concepts and terminology on genetics and inheritance with Mendel's peas and rabbit coat color as examples.	**Examples:** Activity asks students to figure out what shape will maximize the interior space given the amount of material for the perimeter. Activity asks students to read an article or watch a video about genetically modified foods or DNA testing in conjunction with the genetics and inheritance unit.	**Examples:** Activity asks students to design the office that will hold the most desks given some constraints. Activity asks students to engage in a simulation about inheritance of a genetic condition. The condition is prevalent in communities that are unfamiliar to most students and/or something considered not particularly important (e.g., tongue rolling).	**Examples:** Activity asks students to design a more effective layout for the school cafeteria given some constraints. Activity asks students to engage in a simulation about inheritance of a genetic condition that is likely to be prevalent in students' own communities and/or one that they would likely care about.	**Examples:** Activity asks students to design a more effective home layout for a local resident, who is paraplegic, given some constraints. Activity asks students to engage in a simulation about inheritance of a genetic condition, and to interview a person with that condition about what their life is like and what they wished others would know about that condition. The condition is likely to be prevalent in students' communities and/or one that they would likely care about.

A2. Activity calls for students to **guide their own learning** of science or engineering.

Note: Users of this rubric have commented that it is important to review all the examples as you score.

0	1	2	3	4
Activity does not offer any opportunity for students to make decisions about their learning experience.	**Activity calls for students to make some decisions** about their learning experience, **but the decisions are not related to science or engineering aspects of the experience.**	Activity calls for students to make decisions related to science or engineering aspects of their learning experience. However, these decisions **don't really impact what, how, or to what degree students will learn the science or engineering.**	Activity calls for students to make decisions related to science or engineering aspects of their learning experience. **These decisions impact what, how, or to what degree students will learn the science or engineering.** Students are **not** prompted to reflect on and potentially adjust their decisions.	Activity calls for students to make decisions related to science or engineering aspects of their learning experience. These decisions impact what, how, or to what degree students will learn the science or engineering. **Students are prompted to reflect on and potentially adjust their decisions, making course correction as necessary.**
Examples: Students read and answer questions about the reading. Students follow a guided lab step by step.	**Examples:** Students are prompted to choose color, font, style, layout, or order of simple sub-tasks. Students are told they may listen to music if they want, do their work in the library or outside, or work in a group of their choice.	**Examples:** Students can choose how many grams of mass to test in a Newtonian force experiment or what type of container to use to collect pond water, with similar results expected regardless of their choice. Students can choose among different available materials, product types, or optimization processes that yield similar outcomes (e.g., which insulator to use for a thermos when all of the available options are known to be good insulators).	**Examples:** Students can choose what questions they investigate about linear motion of objects, or how they will figure out how polluted a pond is. Students can choose the engineering problem, success criteria, design constraints, and development and/or optimization process, which make a difference to the solution's quality (e.g., size and materials of a thermos when these choices would have significant impact on the quality of insulation).	**Examples:** Students are prompted to do what's described on the column to the left, and to brainstorm pros and cons of their decision through check-ins with the teacher or classmates. Students are asked to produce a summative reflection on the engineering design decisions they made and the impact of those decisions.

A3. Activity calls for students to **discover science principles or effective engineering designs.**

0	1	2	3	4
Activity does not call for students to discover science principles or engineering designs through direct experience (i.e., does not involve experiments, fieldwork, dissection, simulations, modeling, or any of the stages of the engineering process).	Activity calls for students to **discover** science principles or engineering designs. **The discovery happens in the form of watching a demonstration** (e.g., teacher or video demo)	Activity calls for students to discover science principles or engineering designs. **Students are called to discover the principles themselves, but the discovery is guaranteed if they follow the procedures provided** (e.g., lab or engineering procedures where step-by-step instructions are provided).	Activity calls for students to discover science principles or engineering designs. Students are called to discover the principles themselves. **The instructions call for students to explore different options, potentially leading to multiple explanations or solutions. The activity calls for students to articulate the principles / designs they discovered through the activity.**	Activity calls for students to discover science principles or engineering designs. Students are called to discover the principles themselves. The instructions call for students to explore different options, potentially leading to multiple explanations or solutions. The activity calls for students to articulate the principles / designs they discovered through the activity. **The activity calls for students to have extended conversations or reflections about the principles / designs they discovered through the activity.**
Examples: Activity asks students to practice procedures or describe concepts already introduced to them. Lecture, reading, online research, and/or videos. Activity asks students to watch demonstrations or conduct labs that confirm what they've already learned.	**Examples:** Teacher shows a simulation of how sunlight, ocean, atmosphere, ice, landforms, and living things impact weather, and how that differs based on location and geography. Teacher shows how different configurations of 10 popsicle sticks withstand different amounts of weight.	**Examples:** Activity asks students to follow procedures in an online simulation to discover what the weather would be under different scenarios. Activity asks students to configure 10 popsicle sticks in five predetermined ways and test which configuration withstands the most weight.	**Examples:** Activity asks students to explore an online simulation to discover how sunlight, atmosphere, ice, latitude, etc., impact weather. Activity asks students to explore what configurations of 10 popsicle sticks withstands the most weight, without guidance on which configurations they should test.	**Examples:** What's on the left column but with added requirement to: [for the weather example] Discuss patterns they see about the different elements and weather. [for the structural durability example] Discuss not just which configuration was the "best," but also what patterns there were in low- and high-durability designs and why that might have been.

A4. Activity calls for students to **integrate information gleaned from secondary sources into scientific explanations or engineering solutions.**

Note: This dimension is about secondary research (i.e., obtaining information from existing sources such as texts and videos), rather than first-hand discovery of information.

0	1	2	3	4
Activity does not ask students to gather information. **OR** **Activity calls for students to gather information from just one source** (assumed to be the case if instructions do not specify that information must come from multiple sources). **OR** **Assignment is not complex enough to benefit from use of multiple sources.**	Activity calls for students to gather information from **multiple sources.**	Activity calls for students to gather information from multiple sources. **Activity asks students to combine information from multiple sources to form conclusions.**	Activity calls for students to gather information from multiple sources. Activity asks students to combine the information from multiple sources **to explain a science principle or justify an engineering design.**	Activity calls for students to gather information from multiple sources. Activity asks students to combine the information from multiple sources to explain a science principle or justify an engineering design. **Activity asks students to attend to the credibility, accuracy, and possible bias of each information source.**
Examples: Students read an assigned article about climate change. Doing an experiment or engineering design task that doesn't involve searching for information. Students must do a quick online search to find an example of a city or country that has been impacted by climate change.	**Example:** Students must search online to find ways that human activity in developed and developing countries is contributing to climate change, consulting at least three different sources.	**Example:** Students must do what's indicated on the left, and combine the information they find into a broader conclusion they express on a poster or in a few paragraphs, rather than listing facts or examples separately.	**Example:** Students must do online research on human contributions to climate change, consulting at least three appropriate sources and drawing a conclusion from them that they either (1) use to justify an engineering design, or (2) apply in a scientific explanation of how climate change trends could affect a place or a population/species they care about.	**Example:** Students must do what's indicated on the left. In addition, they must write a paragraph on why they chose the sources that they did (e.g., what made them think the sources they consulted were reliable and adequately comprehensive).

A5. Activity calls for students to **collaborate** substantively.

0	1	2	3	4
Activity does **not call for students to work together.**	Activity calls for students to work together, but **does not call for students to create a shared product(s).**	Activity calls for students to work together **towards a shared product(s). For many groups, the product(s) can be completed with one round of discussion and decision-making** (e.g., on what to do and who does which part).	Activity calls for students to work towards a shared product(s). **The product is sufficiently complex that, for most student groups, one round of discussion is likely to be insufficient for its successful completion.**	Activity calls for students to work towards a shared product. The product is sufficiently complex that multiple rounds of agreement on what-to-do and who-does-what are necessary for the successful completion of the product. **In addition, the activity specifically calls for students to explicitly attend to their process and/or efficacy of collaboration** (e.g., asking them to establish group norms or reflect on the extent to which they collaborated successfully).
Example: Activity calls for students to work on a guided physical science lab by themselves.	**Example:** Activity calls for students to work on a guided physical science lab as a group, but to write individual lab reports.	**Example:** Activity calls for students to work on a guided physical science lab as a group and to collaboratively type up a data table, analysis, and conclusion as a slideshow.	**Example:** Activity calls for students to work on a series of three physical science labs as a group and to create a three-minute educational presentation of what they learned that includes ideas from every student. It asks students to discuss and decide as a group how to present their lab methods, results, and conclusions so that a classmate who did not do the lab would understand what was done and what was learned.	**Example:** Students must do what's on the left. In addition, the activity asks students to do at least one of the following: 1. create and adhere to a set of group agreements. 2. use a discussion protocol that allows every student's opinion to be heard and considered. 3. discuss with their group, at the end, where they appreciated other group members' contributions and areas they'd like to improve in terms of teamwork.

A6. Activity calls for students to effectively **organize, style, and format their communication.**

Note: This is a generic rubric that can be used to assess a variety of communication products (e.g., presentations, videos, and posters).

0	1	2	3	4
Activity calls for students to communicate simple information (about science or engineering) that is equivalent to two sentences or less.	Activity calls for students to communicate simple information (about science or engineering) **that is equivalent to at least a paragraph in content.**	Activity calls for students to communicate **fairly complex or nuanced information** (about science or engineering) **that is equivalent to at least three paragraphs.** **The content of the communication is heavily scaffolded so students do not have to organize or structure it themselves.**	Activity calls for students to communicate fairly complex or nuanced information (about science or engineering) that is equivalent to at least three paragraphs. The activity calls for students to **effectively organize (structure)** their communication.	Activity calls for students to communicate fairly complex or nuanced information (about science or engineering) that is equivalent to at least three paragraphs. The activity calls for students to effectively organize (structure) their communication. **The activity calls for students to obtain feedback on a draft communication and improve their communication approach based on feedback.**
Examples: Students copy notes, play an educational game, or dissect something without recording anything. Students answer multiple choice and short-answer questions on science or engineering. Students complete guided labs or homework where responses are less than a sentence per question.	**Examples:** Students are asked to make a slide show consisting of photos of the different species of insects they saw in their field trip. Students are asked to draw a diagram of their engineering design and write a few sentences on what it does.	**Examples:** Students are asked to make a slide show consisting of (1) photos of different species they saw in their field trip, (2) what the environment (climate, habitat) was like, (3) how the organisms might be related as a food web, and (4) what could happen if one of the species disappeared. Students are provided with guidance on what each slide should look like and contain. Students are asked to create an engineering manual, and specific guidance is given about what information should be included and in what order.	**Examples:** Students are asked to create an informational piece (e.g., slide show, video, paper essay, presentation, or skit) with informational content described on the left. They are told to not necessarily present the information in the order listed, but to try to make it in a form that can help educate and inspire visitors. Students are asked to create an engineering manual that helps people understand what their product is about and how to use it. Students are directed to think about the interests and circumstances of their perspective users as they design the manual.	**Examples:** Students participate in a debate or moderated panel discussion on a scientific topic (where they get continuous real-time feedback). Lessons involve feedback sessions (by teacher or student) as part of the developmental process for communicating information. Students create an engineering manual as described at left with a feedback session (involving peers, teacher, or community members) and a round of manual revision.

S1. Student(s) did/created something that **addresses a real-world problem or concern.**

Don't Score	0	1	2	3	4
Assignment didn't ask for student(s) to create something related to a real-world problem or concern.	**Student product is missing, incomplete, and/or misses the point.**	The student's product **relates to a real-world problem or concern, but it's hard to tell why or how anyone outside the classroom would think it's useful.**	**Student did/created something that could be of interest/use to people outside the classroom.** **But the product is not very original or creative. It mainly rephrases or repeats information that's already available.**	Student did/created something that could be of interest/use to people outside the classroom. **The student's work is original or creative.**	Student did/created something that could be of interest/use to people outside the classroom. The student's work is original or creative. **In addition, the student provided evidence that either (1) they thoughtfully reflected on strengths and weaknesses of their design and/or (2) their product was appreciated by others.**
Examples: Assignment included notes and/or guided labs	**Examples:** [For an assignment about explaining genetic inheritance] Students create a poster about hemophilia symptoms. [For an assignment about designing a solution for the decline of pollinators] Students create a tri-fold about watermelons with no mention of pollinators.	**Examples:** [re: genetic inheritance] Students complete a multiple-choice quiz that asks questions about the process of genetic inheritance with a key to the correct answers. [re: pollinators] Students create a poster that says "don't swat the bees" with no further explanation.	**Examples:** [re: genetic inheritance] Students write a description of common birth defects and how they can be passed on by carriers who do not themselves exhibit the defect. [re: pollinators] Students create an educational slide show or pamphlet that describes the decline of the bee population.	**Examples:** [re: genetic inheritance] Students create a prototype of an app that parents with a genetic mutation could use to compute the odds of their child having the associated condition. [re: pollinators] Students create a comic book for younger students, conveying the importance of pollinators and how humans can help preserve their habitat.	**Examples:** Students create the app/comic book (left), with a letter of support from a user, and/or a written reflection on strengths and weaknesses of the product.

S2. Student(s) learned through **practicing science** (investigating, evaluating, developing explanations).

Note: As described in p.44-45 in A Framework for K-12 Science Education, scientists engage in three spheres of activity: "investigation" is about asking questions of and collecting evidence from the real (and natural) world empirically; "developing explanations" is about coming up with theories, models, and hypotheses about the world; "evaluating" is about arguing, critiquing, and analyzing the ideas and observations arising from the other three spheres.

Don't Score	0	1	2	3	4
Activity does not involve practicing science (i.e., does not involve investigation, developing explanations, or evaluating science ideas or observations).	**Student's work doesn't show that the student engaged in investigation, developing explanations, or evaluating science ideas or observations.**	Student's work shows that the student **successfully practiced some aspects of the following, but has a lot of room for growth:** • ***Investigating*** the natural world (i.e., systematically collecting data through experiments, dissection, field work, or simulation) • ***Developing explanations*** about the natural world (forming hypotheses, models, and/or theories) • ***Evaluating*** their investigations, hypotheses, models, and/or theories	Student's work shows that the student successfully practiced **at least one** of the following: • ***Investigating*** the natural world (i.e., systematically collecting data) • ***Developing*** explanations about the natural world (forming hypotheses, models, and/or theories) • ***Evaluating*** their investigations, hypotheses, models and/or theories	Student's work shows that the student successfully practiced **at least two** of the following: • ***Investigating*** the natural world (i.e., systematically collecting data) • ***Developing explanations*** about the natural world (formulating hypotheses, models, and/or theories) • ***Evaluating*** their investigations, hypotheses, models and/or theories	Student's work shows that the student successfully practiced all **three** of the following: • ***Investigating*** the natural world (i.e., systematically collecting data) • ***Developing explanations*** about the natural world (formulating hypotheses, models, and/or theories) • ***Evaluatin***g their investigations, hypotheses, models and/or theories
Examples: Student learned through textbooks and online articles/ videos rather than through examining nature themselves. Student practiced procedures they already know (or should know), such as balancing chemical equations.	**Examples:** Student work indicates that... Student answered questions or formed explanations without consulting any data.	**Examples:** Student work indicates that... Student collected a small amount of data on the number and types of microinvertebrates in two stream samples, but the data were inconsistent/ incomplete (not all variables were collected on every occasion). Student explored the gas phase in a simulation about heat and states of matter without exploring liquid or solid states.	**Examples:** Student work indicates that... Student systematically collected data on microinvertebrates in two stream samples (all variables were collected on every occasion). Student explored gas, liquid, and solid phases in a simulation about heat and states of matter.	**Examples:** Student work indicates that... [re: Microinvertebrate example on the left] In addition, student analyzed the differences between the two streams and suggested why the groups may be different. [re: phase change example on the left] In addition, student used observations of the simulation to form an explanation of the relationships among heat, molecular motion, and phase.	**Examples:** Student work indicates that... [re: Microinvertebrate example on the left] In addition, student assessed why the analysis is important and what should be researched next. [re: phase change example on the left] In addition, student evaluated their explanation by discussing their observations and inferences with classmates who had used the simulation in a different group.

S3. Student(s) made sound use of the **engineering design process** (i.e., define, develop solutions, optimize)

Note: See ETS1: Engineering Design here for NGSS's more specific expectations of middle school students' understanding of the engineering design processes.

Don't Score	0	1	2	3	4
Not an engineering lesson.	**Student work doesn't show that engineering design process was practiced.**	**Student work suggests that student successfully did at least one of the following:** • Defined the exact problem they needed to solve through engineering • Designed a solution to the problem • Evaluated their solution (e.g., through testing or peer review) • Refined their solution based on the evaluation	Student work suggests that student successfully did **at least two** of the following: • Defined the exact problem they needed to solve through engineering • Designed a solution to the problem • Evaluated their solution (e.g., through testing or peer review) • Refined their solution based on the evaluation	Student work suggests that student successfully did **at least three** of the following: • Defined the exact problem they needed to solve through engineering • Designed a solution to the problem • Evaluated their solution (e.g., through testing or peer review) • Refined their solution based on the evaluation	Student work suggests that student successfully did **all four** of the following: • Defined the exact problem they needed to solve through engineering • Designed a solution to the problem • Evaluated their solution (e.g., through testing or peer review) • Refined their solution based on the evaluation
Examples: Student did a dissection, field work or experiments, secondary research, or other science activities that are not done in conjunction with the engineering design process.	**Examples:** Student work describes a chair they made with wood and beads. There is no indication that the chair is a solution to a specific problem.	**Examples:** Student work describes a specific problem that needs to be solved through engineering (e.g., blue light emitted from screens is potentially harmful to eyes).	**Examples:** Student work includes the blue light problem statement on the left plus **a blueprint of a possible solution** that would permit screen use without endangering eye health.	**Examples:** Student work includes the blue light problem statement and blueprint of a solution described on left plus **product feedback obtained from peers.**	**Examples:** Student work includes the blue light problem statement, blueprint of a solution, product feedback obtained from peers described at left, **plus a blueprint of an improved version of the product that addresses the peer feedback.**

S4. Student(s) critically **integrates existing information** into science explanations or engineering solutions.

Note: This dimension is about secondary research (i.e., obtaining information from existing sources such as texts and videos), rather than first-hand discovery of information. Refer also to NGSS middle school standards on obtaining, evaluating, and communicating information: https://ngss.nsta.org/Practices.aspx?id=8)

Don't Score	0	1	2	3	4
Student was not asked to gather existing science/ engineering information.	**Student gathered information from only a single source.**	Student gathered information from multiple sources, but **some sources were not appropriate and/ or students listed information from different sources without integrating them.**	Student gathered information from multiple sources. **Most/all** sources were appropriate. **Student combined information from multiple sources to describe known facts** rather than to form a conclusion, explanation, or design.	Student gathered information from multiple sources. **All** sources were appropriate. **Student integrated the information from multiple sources to form a conclusion, explanation, or design.**	Student gathered information from multiple sources. All sources were appropriate. Student integrated the information from multiple sources to form a conclusion, explanation, or design. **Student demonstrated attention to the credibility, accuracy, and possible bias of their information sources.**
	Example: Student found information about environmental benefits of wildfires in an article by National Geographic.	**Example:** Student listed what three different websites said about benefits of wildfires.	**Example:** Student combined information from three different articles on wildfires, writing about what it is and known causes, benefits, and concerns.	**Example:** Student combined information on three different articles on wildfires to explain why it is important to design ways to fireproof houses in Sonoma County, including what materials may be appropriate.	**Example:** Student combined information on three different articles on wildfires to explain why it is important to design ways to fireproof houses in Sonoma County, including what materials may be appropriate. Students cite their sources and mention that information from fireproofing contractors might be biased toward selling their product.

S5. The organization, style, and format of the student's work is effective.

Note: This is a generic rubric that can be used to assess a variety of communication products (e.g., presentations, videos, and posters).

Don't Score	0	1	2	3	4
Student(s) were not tasked with work where organization, style, and format matters.	**The work is incomplete, and/or so disorganized that the teacher/ audience cannot easily discern the student's purpose.**	The work is complete. **There is an attempt at organization, but it's not very effective** because the teacher/ audience cannot easily discern the student's conclusion, explanation, or recommendation related to science or engineering.	The work is complete. The organization of the work makes sense; and the **teacher/audience can discern the student's conclusion, explanation, or recommendation** related to science or engineering; but the format and style is not very effective.	The work is complete. The organization of the work makes sense; the teacher/audience can discern the student's conclusion, explanation, or recommendation related to science or engineering; and the **format and style are effective.**	The work is complete. The organization of the work makes sense; the teacher/audience can discern the student's conclusion, explanation, or recommendation related to science or engineering; and the format and style are effective. **The message communicated through the work is compelling and convincing.**
Examples: True or False/Multiple choice worksheet Online tutorial	**Examples:** A poster or presentation where the topic is unclear.	**Example:** A presentation with beginning, middle, and end, but some of the parts don't seem connected with each other.	**Example:** A presentation with a beginning, middle, and end that are all connected. However, there are distracting fonts, transitions, or images.	**Example:** A presentation with a beginning, middle, and end that are all connected and provide good information. It is clear what the key points are.	**Example:** A presentation with a beginning, middle, and end that are all connected and provide good information. It is clear what the key points are and the presentation inspires action from the audience.