

SCIENCE PEER REVIEW WORKSHEETS

CORRESPONDING LESSON

[🔗](#) (click title for link): Beyond “Good Job!” - Practicing Scientific Feedback

KEY TERMS

- Constructive feedback
- Peer review

KEY SKILLS

- Evaluating science work
- Giving constructive feedback
- Writing clearly and professionally

GRADE LEVEL

Middle and high school

NGSS CONNECTIONS

Practices: obtaining, evaluating, and communicating information

ESTIMATED TIME

30+ minutes (variable)

MATERIALS

- Class set of science-related student work ready for peer review (e.g., lab report, poster, research paper, or science fair project)
- Class set of one of our “Science Peer Review Worksheets” (print or upload to LMS)
- Student science notebooks (paper or digital)

SUMMARY

Our Science Peer Review Worksheets help students organize their feedback on classmates’ science-related work – such as lab reports, presentations (e.g., posters), research papers, and science fair projects. We provide two types of worksheets:

- **Scientific Method Worksheet:** models the structure sometimes used by scientists to give feedback on scientific reports intended for publication (e.g., journal articles). Designed for work based on the scientific method (introduction, hypothesis, methods, results, discussion, etc.).
- **Science Communication Worksheet:** supports giving structured feedback on science projects that may not include the scientific method (e.g., essays, presentations, videos, etc.).

LEARNING OBJECTIVES

By the end of this activity, students will be able to:

1. Practice giving constructive feedback using a structured approach

This activity can be used to support any content standards - the goal is to help students participate in constructive peer review.

PRIOR KNOWLEDGE

To help students identify qualities of constructive feedback for science-related work, we recommend you introduce these worksheets using our [“Beyond ‘Good Job!’ - Practicing Scientific Feedback”](#) lesson.

TEACHER GUIDE

BACKGROUND INFORMATION

Peer review describes the act of sharing and integrating feedback. It can be formal (e.g., providing structured feedback on a peer's work) or informal (e.g., sharing a paper that a peer may find interesting). In science publishing, peer review occurs when a scientist (**peer**) evaluates another scientist's work (i.e., manuscript) and provides feedback. This peer may share what they liked, what could be changed, or what needs to be changed to improve the work. For example, they may compliment the experimental design but suggest alternative statistical tests to analyze the data. While the **peer review publishing process** often serves as quality control and is a structured way to give and receive feedback, it is just one form of peer review. For example, scientists may share "informal" feedback with their colleagues as they develop their studies or practice communicating their research. While peer review looks different depending on the context, the general goal is the same: to improve another's work.

MATERIAL PREPARATION

See our [*"Beyond 'Good Job!' - Practicing Scientific Feedback"*](#) lesson for more details.

Activity Overview

The Science Peer Review Worksheets support your students with providing constructive feedback on their classmates' science-related work. In both worksheets, feedback is separated into four main categories: **Summary**, **Overall Reviewer Impressions**, **Scientific Changes** (the "what"), and **Presentation Changes** (the "how"). For both scientific and presentation changes, students are asked to prioritize their feedback as either **major** or **minor**. Because this worksheet supplements other class activities, it can be used whenever students peer review their classmates' work.

Activity Setup

Before Class:

1. Depending on what students peer review, choose either the "Scientific Method" or "Science Communication" worksheet. Print enough copies for each student or upload to your LMS.
2. If possible, make copies of and anonymize the student work being reviewed. For example, with typed lab reports, duplicate the files and remove the author's name. **We highly recommend this step to keep students' original work intact.**

(**Activity Setup** is continued on the following page)

TEACHER GUIDE

During Class:

1. Have each student *thoroughly* read, listen to, watch, etc. their classmate's work. Encourage them to jot down comments, ideas, or questions in their science notebooks - they will use these notes to formalize their feedback on the worksheet after they are familiar with their classmate's work.
2. Share your expectations with students for completing the worksheet. For example, what does constructive feedback look like, do they need to write in complete sentences, etc.?
3. Now, give each student a peer review worksheet (or refer them to your LMS).
4. Ask students to complete the worksheet using the notes they took earlier, and going back to their classmate's work if needed.
5. Have students turn in the worksheet to you.

After Class:

1. Read the students' comments to ensure they align with your expectations, and add your feedback directly on the worksheet - for example, you may agree with the peer reviewer, or you may explain why a change isn't necessary.
2. Remove the reviewer's (student who reviewed) name from the worksheet before sharing it with the author (student whose work was reviewed).

TEACHER GUIDE

EXTENSIONS

- Visit our preprint server (eRxiv.org) for examples of **Scientific Feedback** given to middle and high school students on their **preprints** (scientific manuscripts that have been posted online on a preprint server but have not gone through the formal peer review publishing process). Each eRxiv preprint receives scientific feedback from our volunteer scientists. In small groups or as a class, have students read the scientific feedback and discuss: *what makes this feedback “constructive” or helpful and meaningful?* Note: while the organization of the scientific feedback posted on eRxiv.org differs from the worksheets, both address the same key components.
 - For an added challenge, have students read the *preprint* first, practice giving feedback with the Scientific Method Worksheet, and then compare their feedback with the posted feedback.

To find the Scientific Feedback:

1. Go to eRxiv.org
2. Click on the “Browse Preprints” tab at the top of the website
3. Click on any of the articles (in individual boxes)
4. Scroll to the bottom for the “Scientific Feedback” section

Note: encourage students to focus on the content rather than the people giving/ receiving the feedback. This activity isn’t about finding what someone did “right” or “wrong” but is instead an opportunity to learn from others!

ASSESSMENTS

- See our *“Beyond ‘Good Job!’ - Practicing Scientific Feedback” lesson for possible assessments.*

REFERENCES

The following guide was referenced to create these worksheets:

- Foster, A., Hindle, S., Murphy, K. M., Saderi, D. (2021). Open Reviewers Reviewer Guide. *Zenodo*. <https://doi.org/10.5281/zenodo.5484086> - Copyright 2021 PRReview (CC-BY 4.0)



This work is sponsored by National Science Foundation Grant #2405867. Any opinions, findings, and conclusions or recommendations expressed in this material are those of the author(s) and do not necessarily reflect the views of the National Science Foundation.

At eRxiv and JEI, we are committed to providing the tools, mentorship, and community necessary for any middle or high school student to publish and share their research with other students and the broader scientific community. Visit us at eRxiv.org and emerginginvestigators.org.

STUDENT WORKSHEET

PEER REVIEW WORKSHEET: Scientific Method

REVIEWER'S SUMMARY

Have you ever received feedback from someone - like a classmate, coach, or judge - and thought, "Did they even pay attention?" To give constructive feedback, you need to thoughtfully engage with the work you are reviewing.

Writing a summary not only shows that you read, listened to, or watched your classmate's work - it also helps you better understand the material. To write your summary, use the questions to the right as a guide. If you're unsure how to respond, revisit your classmate's work - did you miss or skip a section? Alternatively, did they not include this information, or is it unclear?

☐ For each of the following, write 1-2 sentences:

☐ Research question: what did your classmate want to know?

☐ Hypothesis: what did your classmate think would happen?

☐ Methods: what did your classmate do to test their research question?

☐ Results and conclusion: what did your classmate discover? Does the conclusion make sense based on their results?

STUDENT WORKSHEET

REVIEWER'S OVERALL IMPRESSIONS

Now that you are familiar with your classmate's work, share your main impressions: what did they do well? What could they do differently?

Student Example

Strength: It's neat that you repeated your experiment and saw the same results both times!

Suggestion: Were you more interested in the food that brine shrimp eat or the salinity (salt content) of their environment (the water tanks)? It wasn't always clear.

☐ Share **at least two** overall strengths of your classmate's work (3-4 sentences):

☐ Give **at least two** overall suggestions to improve your classmate's work (3-4 sentences):

STUDENT WORKSHEET

SCIENTIFIC CHANGES This section is for feedback on the scientific content. For example, did your classmate state an incorrect fact? Did they label the wrong variable as dependent? Did they use appropriate controls? For this section, aim for <u>3</u> major and <u>5</u> minor comments. Major comments are those you think are the <i>most</i> important to change. While providing feedback, think about what changes are realistic - for example, your classmate might not be able to redo their experiment, but maybe they can analyze their data in a different way. <i>Student Example</i> <i>Major 1: You asked, "How do different salinity concentrations affect the size of brine shrimp?" However, you hypothesized that brine shrimp will have smaller hatching rates at lower salinity levels. Based on your data, I think your research question should be rewritten with hatching rate instead of size.</i> <i>Minor 1: What environment were the tanks placed in (light, temperature, etc.)?</i>	MAJOR 1. 2. 3. MINOR 1. 2. 3. 4. 5.
--	---

STUDENT WORKSHEET

COMMUNICATION CHANGES Here, you will give feedback on how your classmate presented their ideas, rather than suggesting changes to the scientific content. For example, are there sections that need more detail? Are there too many colors in a visual (table or graph) that distracts from the main patterns? Constructive feedback doesn't just criticize how someone communicates. Instead, good feedback explains what's unclear and provides suggestions on what to change. Like the <i>Scientific Changes</i>, aim for <u>3</u> major comments and <u>5</u> minor comments. <i>Student Example</i> <i>Major 1: I liked that you used colors for the different salinity concentrations, but they weren't always the same. For example, you sometimes showed "Low Salinity" in blue and other times in green. Keeping the colors the same would be helpful.</i> <i>Minor 1: In your Conclusion, some sentences were really long, which made the main ideas get lost. You might want to break this text into smaller sentences.</i>	MAJOR 1. 2. 3. MINOR 1. 2. 3. 4. 5.
---	---

STUDENT WORKSHEET

PEER REVIEW WORKSHEET: Science Communication

REVIEWER'S SUMMARY

Have you ever received feedback from someone - like a classmate, coach, or judge - and thought, "Did they even pay attention?" To give constructive feedback, you need to thoughtfully engage with the work you are reviewing.

Writing a summary not only shows that you read, listened to, or watched your classmate's work - it also helps you better understand the material. To write your summary, use the questions to the right as a guide. If you're unsure how to respond, revisit your classmate's work - did you miss or skip a section? Alternatively, did they not include this information, or is it unclear?

☐ For each of the following, write 1-2 sentences:

☐ Topic: what was the main topic? Describe with detail.

☐ Format: describe how your classmate shared their ideas (essay, drawing, sculpture, song, video, etc.)? Did this format allow them to communicate their knowledge well?

☐ Purpose: what do you think was the main goal of the project? Was it to educate, create, critique, etc.? How did the symbols used (colors, sound, or text) communicate ideas?

☐ Audience: who is the intended audience? Is it for peers, a teacher, or the public?

STUDENT WORKSHEET

REVIEWER'S OVERALL IMPRESSIONS

Now that you are familiar with your classmate's work, share your main impressions: what did they do well? What could they do differently?

Student Example

Strength: Your video about microplastics and how they're affecting fish health was interesting, and I learned a lot. Your video was very detailed. For example, I didn't know that microplastics can make some fish "full," so they don't eat as much.

Suggestion: I had to rewind the video several times because you spoke too fast - for example, when you were describing what microplastics are, I couldn't hear some of your explanation. I think you should re-record your video and talk at a slower pace.

☐ Share **at least two** strengths of your classmate's work (3-4 sentences):

☐ Give **at least two** overall suggestions to improve your classmate's work (3-4 sentences):

STUDENT WORKSHEET

SCIENTIFIC CHANGES This section is for feedback on the scientific content. For example, are the ideas accurate and factual? Is there enough background information for the audience to understand the topic? Is the content appropriate for the audience? For this section, aim for <u>3</u> major and <u>5</u> minor comments. Major comments are those you think are the <i>most</i> important to change. While providing feedback, think about what changes are realistic - for example, your classmate might not be able to research a new topic, but maybe they can describe it in a different way. <i>Student Example</i> <i>Major 1: In the beginning of your video, you said microplastics are metals, but they're not. They're just very small pieces of plastic.</i> <i>Minor 1: You said fish "felt sad" by the microplastics a few times. What do you mean by "sad?" Is their behavior different?</i>	MAJOR 1. 2. 3. MINOR 1. 2. 3. 4. 5.
--	---

STUDENT WORKSHEET

COMMUNICATION CHANGES Here, you will give feedback on how your classmate presented their ideas, rather than suggesting changes to the scientific content. For example, how does the way they communicate relate to the audience; is it appropriate for the target audience? Are there too many visuals (colors, emojis, or images) that distract from the main ideas? Constructive feedback doesn't just criticize how someone communicates. Instead, good feedback explains what's unclear and provides suggestions on what to change. Like the <i>Scientific Changes</i>, aim for <u>3</u> major comments and <u>5</u> minor comments. <i>Student Example</i> <i>Major 1: I thought there were too many memes in your video, and some weren't related to your topic. They distracted me from the other images you had.</i> <i>Minor 1: You put an emoji of a cow next to the word fish. Maybe change the emoji to be a fish?</i>	MAJOR 1. 2. 3. MINOR 1. 2. 3. 4. 5.
---	---