

Level 0: Students do not make a choice about the justifications they read, or make an incorrect choice

Goal: Students will become familiar with the use and purpose of justifications in arguments and will be able to identify common forms of justification in written arguments.

Teaching Strategy: Provide accessible examples of justifications and compile a class chart listing Forms of Justifications

Works Best With: Whole Class

Details

Preparation:

- Chose one of the provided short, themed argument sets (either Eels or Aspen). Each of the argument set contains three arguments, each demonstrating one distinct forms of justification (appeal to authority, personal opinion or data/empirical evidence). You will use one set to introduce the concept of justifications to your students, and the other to allow them independent practice time during follow up lessons.
- As you choose a set, ensure that the content of the arguments is accessible and familiar to your students, so that they can use their cognitive energy on understanding the aspects of argumentation in the argument and not on comprehending new or complex ideas. If you need to provide brief teaching time before providing the arguments, prepare for this as well.
- To introduce the concept of forms of justification, begin by choosing the argument in the set that uses the explication of data/empirical evidence as a form of justification. Since referencing data and empirical evidence are the most highly valued forms of justification in science, starting here allows you to highlight the significance of this form of justification.

Teaching:

- Read the argument, focused on data/empirical evidence that you have selected with the class. Discuss the author's choice of justifying, or clearly appealing to, the reader in an effort to convince the reader of the value of what the author is saying. Make sure to frame this discussion in terms of the chosen focal form of justification (in this case, referencing data).
- Explain that since all arguments are efforts to convince someone that your argument is strong, the form of justification the writer chooses matters: not

- all forms of justification are as highly regarded or as convincing as others in science. Using data or empirical evidence to support your claim is a highly regarded form of justification in science.
- Begin a class chart listing different forms of justification. Write, “data or empirical evidence” on the chart. Place a star next to it, and explain that this to remind students that this is a highly regarded form of justification in science.
 - Provide students with the corresponding argument from the other argument set that also uses data or empirical evidence as a form of justification. Have students read independently, then guide them in discussing why this form of justification helps to make the argument convincing. Emphasize that data is a highly regarded form of justification in science and that when evidence is collected carefully and using reliable methods, it is highly valued in science.
 - In subsequent lessons, follow the same format for introducing other forms of justification:
 - Use an argument from one of the argument sets that contain additional forms of justification: making an appeal to authority or personal opinion, etc.
 - Remind students that some forms of justification are more highly regarded than others in science. As a class, discuss each new form of justification and decide whether or not it is one that is highly regarded in science;
 - Write each new form of justification on the Forms of Justification class chart; place a star next to it if it is usually highly regarded in science.
 - Offer students further opportunities to independently read short arguments and identify forms of justification that they have been learning about. Refer students back to the Forms of Justification class chart to help them recall what they have learned about different forms.

Resources

- **Forms of Justification Class Chart**
- **Eel argumentation set**
 - **Example Argument_Data_Eels**
 - **Example Argument_AtoA_Eels**
 - **Example Argument_PO_Eels**
- **Aspen argumentation set**

- **Example Argument_Data_Aspen Yellow River**
- **Example Argument_AtoA_Aspen Yellow River**
- **Example Argument_PO_Aspen Yellow River**
-

Why This Matters:

Students who are new to scientific argumentation will likely find the idea of justification in science writing to be new, and will need plenty of exposure to this idea in order to become adept at identifying the various types of justification that might be used in arguments. One of the first teaching strategies to employ is to make students aware of this aspect of science writing. For students who aren't fully understanding this concept, the best classroom activities will allow them to discuss and identify the evidence and supporting justifications with their peers on many different occasions. Over time, students will begin to develop a deeper understanding of these parts of an argument and sensitivity to how different kinds of justifications can be used to support an argument in science.