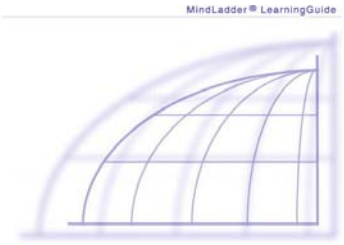

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T-16: Strategies for Inferential Thinking

Do we infer that Mary is hurt when she cries and clutches her elbow? Do we infer that Carsten is cold when he shivers? This knowledge construction function supports the development and use of the habits of mind that are involved in drawing conclusions from evidence (see also T-17). Students need such habits of mind to achieve proficiency hence as thinkers in their own right and hence as consumers of information. The development of this knowledge construction function is accomplished by modeling and reinforcing sound reasoning and by enabling students to recognize fallacious ways of thinking. The development of this knowledge construction function creates awareness within the learner; an awareness that raises the bar and sets a standard that students can respond to both as producers and as recipients of information.

Good strategies for inferential thinking contribute greatly to students' proficiency as thinkers and problem solvers. The rise in their proficiency can be seen in the quality and amount of their output. Prior to the development of this knowledge construction functions students frequently struggle with information and have difficulty making sense of arguments. They may operate with erroneous conclusions yet be unable to identify and correct them. As a result learning is confusing, laborious and hard. Unable to acquire proficiency the academic performance of many students remains shallow and their motivation for school work is uneven or poor.

Sound versus fallacious thinking has long been the object of study by philosophers, logicians, mathematicians, psychologists, educators, jurists and many others. Fallacies are invalid arguments. Some fallacies are easy to detect. Others can be more subtle and difficult to spot. Whether unintended or deliberate, fallacies are commonplace in discourse and communication. Arguments aim to persuade. A desire to persuade may lead to the production of a fallacy. Likewise, a desire

to be persuaded may lead to a failure to recognize a fallacy. Even so, it is likely that many fallacies find their way into human discourse simply due to a lack of knowledge about them.

To develop this knowledge construction function you can model and reinforce sound reasoning while training students to recognize fallacious thinking: You can help students develop good logic by discussing bad logic. It is fun to create and discuss examples of different types of fallacies either as a whole group project or in combination with small group activities. Examples can be created using situations that draw on the world of the elementary, the middle school or the high school student as needed.

Section A-4: T-16 provides a more detailed overview of different forms of good and bad reasoning. Discuss both sound and fallacious ways of reasoning with your students. Guide them, in particular, to be on the look-out for errors of reasoning in their own work and in the information sources they consult and use: Guide them to become critical and proficient thinkers. Here are the two examples of fallacious thinking.

Fallacy: Slippery Slope.

In this fallacy a person asserts that a sequence of increasingly unacceptable events must inevitably follow from another event without any argument for the inevitability of the sequence in question. The argument is used to prove that the initial event is unacceptable.

Examples:

i. If people stop eating carrots, then it won't be long before they stop eating vegetables, and then it won't be long before they stop eating fruit, and then stop eating altogether. Thus, we should not allow people to stop eating carrots.

ii. If kids are allowed to sing in the cafeteria, then they will start to sing in the hallways, and soon they will be singing in the classrooms and this will put an end to all learning. Therefore, children must not sing in the cafeteria.

In the first example, a person wants to argue that people should not be free to stop eating carrots. The person implies that a string of increasingly unacceptable events will happen if people were to have that choice. The sequence ending with the statement that

people will stop eating altogether is used to support the person's original point of view that people should not be allowed to stop eating carrots. This is the format of the slippery slope fallacy. The second example follows it too.

The slippery slope is a fallacy of distraction. Fallacies of distraction are characterized by the illegitimate use of a logical operator in order to distract from the apparent falsity of a given proposition. The slippery slope fallacy, also know as the camel's nose fallacy, involves the illegitimate use of the "if-then" operator.

To prove that the argument in a slippery slope is fallacious first identify the proposition being refuted (e.g. People stop eating carrots). Next identify the final event in the series of events (e.g. People stop eating altogether). Now show that this final event need not occur as an inevitable consequence of the first.

Fallacy: Hasty Generalization

Definition: The size of the sample is too small to support the conclusion.

Examples:

(i) My cat Spout likes cheese. Thus, all cats like cheese. (We shouldn't conclude something about all cats on the basis of one example.)

(ii) I asked three townspeople what they thought of the new shopping center and they agreed it is nice. The new shopping center is therefore generally popular. (A sample of three is likely to be too low to reach a valid conclusion about the population in the town at large.)

Hasty generalization, or jumping to conclusions, belongs to a category of fallacies that involves inductive reasoning. When we reason inductively we infer from the properties of a sample to the properties of a population as a whole. For example, if we see a white swan and then another and another we might infer, by way of induction, that all swans are white. Descriptors like 'iron clad' or 'bulletproof' do not apply to inductive inferences: No inductive inference is perfect. For example, it only takes one swan that isn't white to invalidate the conclusion that all swans are white.

The confidence we have in an inductive inference depends on the size and similarity of the sample relative to the size and diversity of the population. Small samples will tend to be unrepresentative. The larger the size of the sample and the more similar the sample is to the population as a whole the more reliable will be the inductive inference. Hasty generalizations may occur when people do not take the time to collect representative samples. People with bias or prejudice may also jump to conclusions ("My wallet was stolen by a teenager. All teenagers are thieves").

To prove that a generalization is hasty identify the size of the sample and the size of the population. Then identify the similarity of the sample relative to the population. Then show that the sample size is too small.

The purpose of the development of this knowledge construction function is not to teach students the details of formal logic. This is a subject matter in its own right and one that students and teachers may elect to pursue. The purpose of the development of this knowledge construction function is to equip students with the orientation and the foundational tools to distinguish good from bad arguments. The goal is to enable students to become critical producers and consumers of information.

Throughout the curriculum and across the different learning events in the classroom invite your students to appraise the integrity of the reasoning they encounter and produce. Use newspapers and current events to examine the quality of reasoning among groups on either side of the issues involved.