

How to Teach Students about Explanations

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Explanations

One important task in teaching critical thinking is to train students to create and express alternative explanations. The goal of these exercises is to train students to habitually seek multiple explanations (points of view) before reaching a conclusion.

To do this, you must remember that:

- Students can be trained to generate alternative explanations.
- This skill can be measured.
- Most people do not do this naturally.

The following exercise will help you to train students to create multiple explanations and to recognize the possible validity of various explanations.

Consider the following statement:

Jerry failed four tests in a row.

- Ask students to write down an explanation for why he failed these tests.
- After they write an explanation, ask them to write more explanations.
- Count how many explanations each student has.
- After all the answers are in, share the explanations with the entire class so that everyone can see the entire variety of explanations.

Some possible explanations are:

- Jerry is stupid.
- Jerry didn't study.
- Jerry has a learning disability that makes him work very slowly.
- Everyone in the class failed those same tests.
- Jerry's English is not good enough to understand the test questions.
- Jerry missed class on all four of those days.
- Jerry stopped going to class but forgot to drop the course.
- Jerry studied the wrong material all four times.
- The tests were too difficult to pass.
- All of the tests were essay tests, while Jerry had studied for objective tests.
- Jerry worked all night the night before all of these tests. He was so tired that he failed them.
- The four tests were state board examinations. They are so difficult, that it is not uncommon for people to fail them several times before passing them.
- The four tests that he failed were blood tests. He tested "negative" for leukemia each time.

- The tests were designed to identify learning disabilities. Jerry's test results indicated that he does not have any learning disabilities.
- The tests were typing tests. Having been a doctor his entire life, Jerry was used to dictating everything into a microphone, and had never learned how to type.

After the class sees that there are many possible explanations for one fact, repeat the exercise several times until each student is creating numerous explanations in a short period of time. (Below you will find seed statements that can be used for students to generate explanations of events and circumstances).

After the students learn to create various explanations for a single phenomenon, you should train them about **credibility**.

Credibility is an important factor in generating explanations. Students might be able to create explanations, but consider all of them except one or two to be implausible. It is important to train students to accept the plausibility of many explanations by discussing the circumstances under which each may be true. Here, an instructor's skill at generating discussion is essential. It is essential because students may acknowledge that being stupid and not studying are good explanations for failing four consecutive tests; however, they may not readily believe that a learning disability, lack of ability with English, or studying the wrong material are viable explanations. (Interestingly, they may argue that no one is dumb enough to study the wrong material on four consecutive tests, while they believe that you *can* be dumb enough to fail all the tests after having studied).

This unwillingness to accept the credibility of all but the most common explanations is caused by what I call the **feasibility of experience**. By this, I mean that those explanations with which we have much experience seem more plausible than those explanations with which we have little experience. For example, we all know (of) people who are not very intelligent, and (of) people who have not studied for exams. But we may not know anyone with a learning disability, or someone who repeatedly studies the wrong material, or whose English is bad enough to be incapacitating in a testing environment.

Students can be trained to overcome the limitations of the feasibility of experience by discussing in detail the conditions in which any given explanation may be true.

To train the students to do this, ask them to list the conditions that would make the following true:

Jerry has a learning disability that makes him work very slowly.

You will probably find that students cannot list any conditions, or perhaps can list one. Share the following possible answers:

- The test requires extensive reading. Jerry is dyslexic, which makes reading long passages very difficult in short periods of time.

- Jerry may be such a strong auditory learner that he does not do well on tests in which he has to read questions silently.
- Jerry may have dysgraphia: a condition that inhibits his ability to physically form the letters necessary to write, even though he knows the letters and can properly speak the words.
- Jerry may have Attention Deficit Disorder, which will not allow him to concentrate enough to work through an exam from start to finish.

Once students learn that Attention Deficit Disorder, dyslexia, and dysgraphia are real disorders that real people suffer from, and which have real limiting effects, they will acknowledge that the possibility that Jerry failed the tests because of a learning disability is as likely as him failing the test because he did not study.

- Once the students' awareness is raised through this exercise, have them write out conditions in which the other explanations could be true.
- Share all the answers, so that students may see the variety of conditions that make explanations possible.
- Explain to students—after they master the skills of generating multiple explanations and credible conditions—that their first responses were probably limited by their experiences. Ask them if, by seeing a variety of explanations and credible conditions, they now feel more capable of generating more explanations and conditions than they could before. Make sure that they understand that the reason for this is because they became aware that ***explanations and conditions for plausibility need to be consciously sought outside the realms of their own experiences.***

Appendix A: Seed statements

1. Linda broke up with Jerome last night.
2. The Dodgers won the World Series.
3. The stock market gained 280 points today.
4. She quit her job.
5. Jeremy was arrested last night.
6. The President gave an emergency speech last night.
7. The new Spanish government recalled all troops from Iraq yesterday.
8. The poor guy doesn't have enough money to pay his bills.
9. They took a trip over to the coast because they wanted to be alone.
10. The company was flooded with calls on Monday morning.
11. I talked to her last night and everything seemed fine. When I called her this morning, she seemed angry, and she didn't want to talk to me.
12. Your father has taken a turn for the worse.
13. The car went right through the rail and over the cliff.
14. Jerry was accused of receiving stolen property and tried in court.
15. Suddenly, a rock came crashing through the window.
16. For the past six seasons, Hank has been an average baseball player. This season, he is playing so well that he may win the Most Valuable Player Award.
17. Scientists have determined that the polar ice cap is melting at a pace 30% faster than ever before.
18. Congress passed a law today that will severely restrict the government's powers to monitor private conversations of its citizens.
19. My brother has always been a really stable guy. He works hard, he is nice to everyone, he has lots of friends, and he never causes any problems. Just recently, though, he has been quite mean to people. He has been skipping work, going out late, and ignoring his friends.
20. Helen had always been pretty thin. About two months ago she started putting on weight and she's pretty heavy now.
21. Throughout the Midwest, cattle have started dying unexpectedly and in unusually high numbers.
22. The world is an amazing place. Everything is in perfect balance. Plants use the carbon dioxide that humans breathe out, and humans use the oxygen that plants expel. There seems to be the perfect amount of water, of food, and of fuels for everyone.

Appendix B: Interesting citations about explanations.

The power and use of explanations.

"Explanations are so influential that participants continue to give them weight even in the absence of supporting evidence or when the supporting evidence has been thoroughly discredited... This effect is aggravated by the tendency of explanations to blind participants to the existence of alternative explanations.... Furthermore, participants frequently interpret available evidence, especially ambiguous evidence, in such a way as to be consistent with their theoretical commitments..." (Brem, S.K. and Rips, L.J. (2000). "Explanation and evidence in informal argument." *Cognitive Science* 24(4), 573-604, (p.576)).

This citation claims four things:

- Explanations are commonly sufficient for people to believe a claim.
- When evidence suggests that the explanation is false, people commonly believe the explanation, despite evidence that it is false.
- Acceptance of explanations commonly eliminates the need for alternate explanations for most people.
- People commonly fit evidence to support their explanations.

The first step in reasoning.

Philip N. Johnson-Laird says that the first step in the process of human reasoning is that people "imagine a state of affairs in which the premises are true" (<http://webscript.princeton.edu/~psych/PsychSite/~phil.html>).

Explanations vs. arguments.

Explanations are different from reasons and arguments. William Hughes, in his book, Critical Thinking, offers this concise explanation of the difference: "The purpose of an explanation is to show why or how some phenomenon occurred or some event happened; the purpose of an argument is to show that some view or statement is correct or true. Explanations are appropriate when the event in question is taken for granted, and we are seeking to understand why it occurred. Arguments are appropriate when we want to show that something is true, usually when there is some possibility of disagreement about its correctness." (2002, p. 95)