Lesson Plan: The Baloney Detection Kit

By:

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Introduction:

The public is being bombarded by an increasing number of pseudoscientific theories such as magnet therapy and intelligent design creationism. At first glance these ideas seem plausible because they are phrased using scientific language and their proponents often have advanced degrees. The "science" behind these ideas, however, is usually very bad but is beyond the abilities of most people to disprove. For example, practitioners of magnet therapy claim that the Hall Effect and Ohmic heating lead to localized, therapeutic heating of tissues in the vicinity of the magnet. Someone who has had advanced college physics could do a calculation and show that the amount of heating produced by their devices would be negligible. But, people without that training would not be able to do the calculation or even follow it if it were provided to them. This can lead the public to accept these ideas as valid with potentially disastrous consequences. However, many of these ideas are also based on faulty logic and misuse of the scientific method and these errors are much easier to find and explain than the bad science. The motivation behind this activity is to given students some tools to asses the validity of scientific writing that are not based on knowledge of a specific science discipline. Carl Sagan referred to these tools as a "Baloney Detection Kit."

Grade Level: 10 – 12

Time Required: 2 to 4 hours.

Student Objectives:

- Students will enhance their critical thinking skills by studying the different types of logical fallacies.
- Students will practice identifying these fallacies in the writings of pseudoscientists.
- Students will practice their technical writing by preparing a report discussing the fallacies found in their assigned article.

Materials & Resources:

- Printouts of articles from pseudoscientific web sites or magazines. You should analyze the articles to ensure that they have readily identifiable fallacies before

assigning them. I have always found plenty of material at www.atlantisrising.com . Alternative and herbal medicine sites are other good sources, but a few minutes at any good search engine should yield plenty of material. I have used articles on topics such as alien abduction, cattle mutilation, magnet therapy, touch therapy, dowsing, herbal supplements, and ancient astronauts for example.

- Copies of *Why People Believe Weird Things* by Michael Shermer, *The Demon Haunted World* by Carl Sagan, and *Fads and Fallacies in the Name of Science* by Martin Gardner. The first two books contain chapters on logical fallacies and the third has many examples of how they are used by pseudoscientists. All three books are available in paperback for under $20.
- Access to the web to view pages at www.csicop.com and www.skepdic.com . These sites are devoted to rational thinking and to separating real science from pseudoscience and will help you find topics for your students to analyze. They are also good references for you in preparing for this unit.

Plan:

- **Preparation:** You should start by reading the books mentioned above and becoming familiar with the different types of logical fallacies. Visit the two websites and become familiar with their content. Next, research the web and find articles by pseudoscientists for your students to analyze. Make printouts and photocopies of each. Analyze the articles yourself and identify the major fallacies. If you can afford a class set of one of the books, assign the students to read Chs. 1 to 3 of Shermer's book or Ch. 12 of Sagan's book.
- **Day 1:** Lead a discussion about the different types of fallacies and why they are not valid arguments. Use lots of examples from the above mentioned books and call on students to suggest other examples. The attached handout can be used as a starting point for the discussion.
- **Day 2**: Give each student a copy of the same short article. They should read the article carefully and identify the fallacies. If the internet is available, let them research their topic at the skeptical websites. After about 30 minutes, pull the class back together and go around the room and have each student discuss one fallacy they have found. Have them identify the type and justify it as a fallacy.
- **Day 3**: Now give each student or team a longer article and have them repeat the process. If possible give each team a unique article. This time have the students prepare a formal written report or oral presentation. You could also this as homework outside of class.