Dealing with DNA controversy

Description of activity

Dealing with DNA controversy provides students with the opportunity to structure arguments for and against certain biological applications. Students are asked to list arguments and weave them into a persuasive essay with supporting sources.

Learning outcomes

Students will:

1. use Internet resources to research arguments that support or refute controversial statements.
2. use scientific vocabulary in a meaningful context.
3. have intelligent discourse on current scientific topics.
4. connect science issues to concepts learned in class.

Assumptions of prior knowledge

Before assigning this activity, students should possess a general understanding of the topic to be investigated. This type of activity encourages students to connect issues to biological concepts already learned in class.

A general understanding of DNA's structure, function and manipulation is required for any of the issues listed on the student sheet.

Misconceptions

Students may think that there is an "absolutely" correct answer for any scientific question. This type of thinking also manifests itself in the opinion-making process. For a multitude of reasons, students may feel that there is but one correct opinion. It is difficult for them to understand that there are often strong arguments that support and refute an argument.

Implementing the lesson

Become familiar with the *DNA Interactive (DNAi)* web site (www.dnai.org) and how to navigate through it. Provide students with information about navigating the site, and how to play animations and video clips.

Before class:

Photocopy the student sheets.

During class:

It would be a good idea to assess student opinion on a topic to be assigned. The "Topical Barometer" is a simple strategy that provides a quick, accurate picture of student opinion. It can be used when dealing with any topic where students are expected to have widely opposing points of view. It allows students to visually sort where they are on the continuum.

Two different ways this learning tool can be used are:

Each student writes his/her name on a sticky-note and then places it on a continuum in the place that best represents his/her point of view on the issue. See Figure 1.

Establish five different stations around the classroom. See Figure 2.

Figure 1:

Opposed under all circumstances	Opposed under half of the circumstances	In favor under half of the circumstances	In favor under all circumstances

Each student should choose the station that indicates his/her position on the issue by going to the station. Students may then discuss with others at the station why they chose their position. The group can then share one or two of the primary factors influencing station choice.

Figure 2:

Station 1 = Strongly Agree

Station 5 = Strongly Disagree

Station 2 = Agree

Station 4 = Disagree

Station 3 = Neutral

Once students see where they stand in respect to one another, the teacher can divide students into groups comprised of individuals with differing viewpoints. Within the groups, students will be invited to carry-on a discussion. In some situations, a structured academic controversy might be the next step in the assignment. Following the controversy, students should be permitted to move their sticky-notes, if desired.

After working through the Barometer activity, assign the controversial statement as a research topic. Students can then complete the assignment in the computer lab or at home.

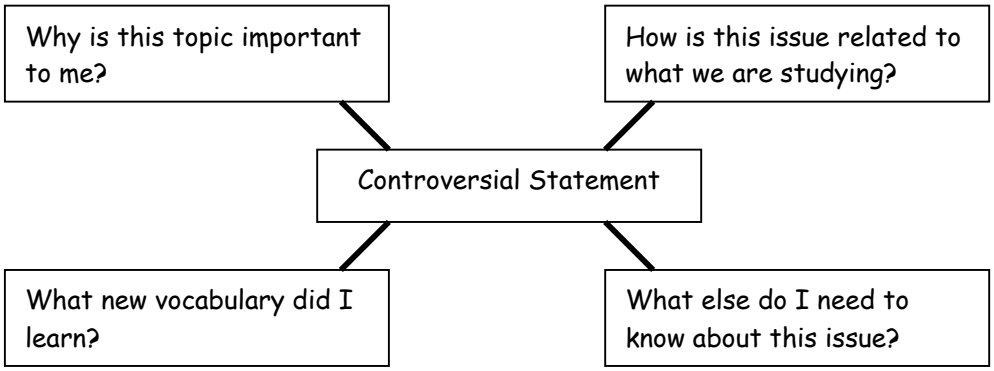
After class:

Provide students with the opportunity to share their findings. Ask students if they found any highly biased web sites that either supported of refuted their position. Also ask if they found web sites they would go back to when completing similar assignments in the future or for information to answer questions they themselves have. Ask if any of them changed their position on the topic as they worked through the assignment and what evidence caused them to do so.

Further explorations

Mapping

Have students construct a graphic organizer to illustrate what they have learned.



Debate

Stage a formal debate of the issue. Team with the English Department in your school to instruct students in correct debate protocol.

Glossary

Specific words to be included in a glossary will vary with the topic being researched. Students should create personal glossaries.

Resources

Web

Access Excellence @The National Health Museum (1994-2003). *ae@nhm: the Site for Health & Bioscience Teachers and Learners*, www.accessexcellence.com

Cold Spring Harbor Laboratory (2002). *DNA From the Beginning: an animated primer on the basics of DNA, genes, and heredity*, www.dnaftb.org

Woodrow Wilson National Fellowship Foundation (2002). *Leadership Program for Teachers: Teacher Resources > Core Websites*, www.woodrow.org/teachers/Teacher_Resources/CORE/core.html

Video/DVD

DNA Interactive (2003). NTSC version produced by Cold Spring Harbor Laboratory and Red Green & Blue Company; funded by Howard Hughes Medical Institute. Available at www.dnai.org

Books

Campbell, Neil and Reece, Jane (2001). *Essential Biology*, Benjamin Cummings, San Francisco.

Micklos, David A., Freyer, Greg A., and Crotty, David A. (2003). *DNA Science: A First Course, (2nd Edition)*, Cold Spring Harbor Laboratory Press, New York.

Magazines

Fitzner, Kenneth. "Issue-Oriented Science". *Science Scope* March 2002, 25 (6).

Activity pages include:

Student worksheets: dealing with DNA controversy introduction; supporting arguments; refuting arguments; and position paper instructions.