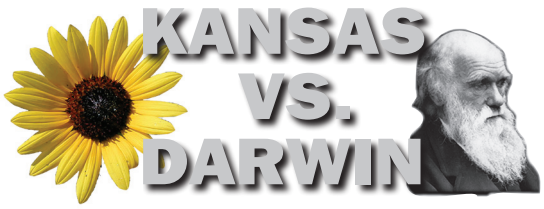

STUDY GUIDE
PREFACE

Convened by Creationists and organized by proponents of Intelligent Design, the Kansas Board of Education hearings on evolution were the subject of worldwide attention and were boycotted by mainstream scientists. This film takes you inside one of the most talked-about events in modern history through exclusive footage and in-depth interviews on both sides of the debate.

The three lessons included in these materials call attention to two areas in science which were part of the basis for the hearings: the validity of the Theory of Evolution, and the definition of science itself. The materials in the Study Guide are not to be considered the last words on the subject but rather to stimulate thinking about how issues in science can be used to accomplish a political agenda.

We welcome your feedback on ways the Study Guide can be improved to enhance student involvement and learning.

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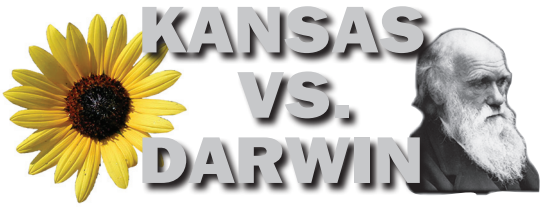


STUDY GUIDE
Lesson One

BACKGROUND FOR STUDENTS:

When Copernicus, Galileo, Darwin, and others used science to explain events in nature, they provided a new viewpoint – one that describes the natural world as understandable, predictable and testable. Their ideas radically challenged traditional thinking.

The Theory of Evolution has created disagreement since Charles Darwin proposed it in 1859. It has been questioned by those who believe in Creationism/Intelligent Design – the idea that organisms were created in their present form and have not changed. Proponents of Creationism/Intelligent Design believe that scientific evidence can be used to determine the existence of "a designer," one responsible for the creation of all life.

A recent challenge to the Theory of Evolution was brought about by the Kansas State Board of Education in 2004 - a body comprised of ten members, six of whom (at that time) espoused Creationism/Intelligent Design. In this case, the challenge to evolution would involve the Science Education Standards – a document which outlines the process of science and the specific content to be taught in public school classrooms across the state.

The usual process of periodically updating the Science Standards is accomplished through the work of a standards-writing committee, a group of experts in science and science education commissioned by the Board. In 2004, however, when the committee presented their final product – a set of standards reflecting the view that all modern organisms are the result of evolution, and that scientific evidence cannot be used to formulate ideas about supernatural causes – a small number of the committee presented a dissenting opinion which would come to be known as the Minority Report.

The Minority Report held that evolution is a theory which is currently challenged in the scientific world – and that the substance of those challenges should be presented to science students in public schools, against the advice of leading scientific authorities around the world.

The Board would settle this disagreement by holding hearings to decide whether evolution is a viable theory or the subject of a true scientific controversy. The hearings were convened by three Board members who were all outspoken advocates of Creationism/Intelligent Design. They enlisted the help of the Intelligent Design Network whose members secured pro-Intelligent Design witnesses from across the nation and from two foreign countries. But the maneuvering on both sides was only beginning.

Anticipating that the hearings would most likely result in favor of their opposition, pro-evolution scientists and science educators across Kansas proceeded to organize a worldwide boycott of the hearings under the banner of Kansas Citizens for Science. The boycott was successful and no one who supported evolution would testify. Nevertheless, the hearings were convened on schedule, May 5, 2005.

The only balance provided in the hearings came from a single individual, a Topeka attorney named Pedro Irigonegaray. (We'll call him Pedro.) He would cross-examine the pro-Intelligent Design witnesses.

Lesson One (continued)

INSTRUCTIONS:

Now it is time to watch the film. It moves quickly so you will have to pay close attention. To understand and follow the events in the film, it is important for you to identify each subject's position on evolution and Creationism/Intelligent Design.

As you see and listen to each person, place a check in the appropriate column on the table. Please check PRO on the table below if the subject named is on the side of Intelligent Design and check CON if against Intelligent Design (in favor of evolution).

Your teacher will stop the film when the chapter title: "A New Definition of Science" appears on the screen.

SUBJECTS (AGENCIES)	PRO	CON
Kathy Martin (Board of ED)		
Steve Abrams (Board of ED)		
Connie Morris (Board of ED)		
Jack Krebs (Citizens for Science)		
Harry McDonald (Citizens for Science)		
Rachel Robson (Citizens for Science)		
Burt Humburg (Citizens for Science)		
William Harris (Int. Design Network)		
John Calvert (Int. Design Network)		
Pedro Irigonegaray (KS Dept. of Ed)		

You may want to discuss your choices with other students to determine if you checked each person's position correctly. After checking each person's position, write a few sentences describing the critical issues expressed by each side in this controversy.

Lesson One (continued)

TO THE TEACHER:

This is a suggested outline to follow when the students view the film. You may wish to change the sequence and or written materials as needed for individual situations.

Lesson One of the study guide is to be used up to the film chapter title, "A New Definition of Science." Stop the film when "A New Definition of Science" appears on the screen.

It is the opinion of the authors of this study guide that student understanding of the issues in the film will be more effective IF:

- Students have a thorough understanding of evolution.
- The film and discussions are divided into three lessons . This first lesson is planned to take about 45-50 minutes, depending on the amount of time for discussion. The teacher would need to make modifications for longer or shorter periods of time.
- Introductory or background material (above) is provided to give the students a better understanding of the controversy, followed by their writing a few statements to describe the position of each side.
- The teacher would help the students understand the National Science Education Standards (NSES), 1996, National Academy Press, page 189, The Origin and Evolution of the Earth System, which states, "The sun, the earth, and the rest of the solar system formed from a nebular cloud of dust and gas 4.6 billion years ago. The early earth was very different from the planet we live on today." Perhaps this should be done after the third segment is completed.
- Through a whole class discussion, be sure the students know what the positions are for each side of the issues before going on to Lesson Two.

A typical 50 minute period could be planned as follows:

- Five minutes to distribute materials and answer questions.
- Ten minutes for students to read the introductory material.
- Five minutes to answer questions about the introductory materials. Give students a clue that they can use organizations to determine whether subjects in the film are "pro" or "con."
- Twenty minutes to view the film from the beginning up to "Definition Of Science."
- Ten minutes to check positions of each person on the film and write the position statement for each side of the controversy.

It is most important that the students be able to match individuals with their agencies and views so as to allow them to focus on the points made by each side. Also they should be able to identify and write the positions for each side of the issue.

Answer Key

SUBJECTS (AGENCIES)	PRO	CON
Kathy Martin (Board of ED)	✔	
Steve Abrams (Board of ED)	✔	
Connie Morris (Board of ED)	✔	
Jack Krebs (Citizens for Science)		✔
Harry McDonald (Citizens for Science)		✔
Rachel Robson (Citizens for Science)		✔
Burt Humburg (Citizens for Science)		✔
William Harris (Int. Design Network)	✔	
John Calvert (Int. Design Network)	✔	
Pedro Irigonegaray (KS Dept. of Ed)		✔

STUDY GUIDE
Lesson Two

TO THE STUDENT:

In Lesson One you were introduced to the documentary's primary characters and learned the position of each one regarding the teaching of evolution. In this lesson, each side in the controversy presents its views on what constitutes a definition of science, and later, each side examines the motivations of its opponents.

Starting with the film segment titled, "A New Definition of Science," the pro-evolution characters argue that science must be limited to evidence provided by natural phenomena, taking no position on questions of faith and belief. This, they say, is because all science depends upon a way of thinking called, methodological naturalism that intentionally omits the idea of spiritual causes from entering into scientific study.

Conversely, the pro-Intelligent Design/Creationism characters argue that science must "follow the evidence wherever it leads," adding that methodological naturalism is a "dogma" of science which places unnecessary and prejudicial limitations upon scientific investigation. Some characters state plainly that they believe science as it is taught today in public schools promotes an atheistic worldview.

The filmmakers do not decide this issue for you, but allow you to hear the arguments of each side and then determine for yourself which is more compelling.

Parenthetically, the sequence also contains facts about and statements made by some of the characters that may call into question their ability to understand the validity of the evidence presented at the hearings and, therefore, to decide fairly and adequately the nature of science. As the viewer, you must decide whether these characters are fit to decide these issues.

In the second part of the lesson, in the segment titled, "The Conspiracy," the two sides accuse each other of conspiring to use science education to promote their view of the world.

Again, the film does not decide these political issues but allows the characters to make specific accusations, followed by each character providing information about his or her religious views and experiences which may or may not be evidence of bias. If characters refuse to provide information about their religious views, you must decide how that weights their arguments against the other side.

Lesson Two (continued)

INSTRUCTIONS:

Based on this material and viewing the film, a number of paraphrased statements are listed. Mark each one with an "X" if you think it represents a view expressed by a person holding a pro-evolution position and mark a "0" for a view you think would be expressed by a person holding a pro-Intelligent Design/Creationism position. At the end of this exercise you will be asked to give your opinion as to which position seems most valid and why.

_____ 1. Explanations in science should be based only on evidence from the natural world.
_____ 2. Kansas taxpayers should not have to pay for hearings that are biased in favor of a certain kind of religion.
_____ 3. You don't have to be an expert in science and understand all the testimony to decide that the controversy over teaching evolution is legitimate.
_____ 4. For the benefit of all concerned, we should present both sides of this controversy in the classroom.
_____ 5. To make decisions on how to teach science, a person needs to have a good understanding of how science works.
_____ 6. These issues are too complicated to be understood by Kindergarten teachers.
_____ 7. A definition of what science is will be different from a definition of what science does.
_____ 8. Science restricts the freedom of religious people to acknowledge God's hand in the creation of the world.
_____ 9. Until we have evidence for it and consider it valid, Intelligent Design should not be considered in public school science classes.
_____ 10. The success of science comes from the discipline of not allowing gaps in knowledge to be filled in by supernatural explanations.
_____ 11. An Intelligent Designer is not necessarily a supernatural being.
_____ 12. Scientists are currently experimenting on scientific problems that have supernatural explanations now, but may have natural explanations in the future.
_____ 13. If Intelligent Design/Creationism had any real evidence, it would be acceptable to science and its proponents would not need to appeal to Boards of Education to get their ideas into the classroom.
_____ 14. Science, as it's taught today, is basically atheistic and Christians in science class are forced to deny their beliefs.
_____ 15. The scientific community asserts its validity through its research and other accomplishments.
_____ 16. The two sides of this argument are not equal.

Considering the information above, in the best interest of you and other students having a good understanding of what science is and how science operates, which side seems to have the better argument? Why?

Lesson Two (continued)

TO THE TEACHER:

In lesson one, the students were asked to match the characters in the film and their organizations to their position on this controversy on evolution. In this lesson the students are asked to go one step further and match statements like those made in the film to the side most likely to have made them. The writers of this study guide believe that when the students examine these statements, it will form a basis for better understanding of the political arguments surrounding teaching evolution in science education.

Instructional plan: The following are only suggestions and will need modification depending on the situation. The teacher should look carefully at the statements that the students are to consider and remove any that are believed to be too controversial for individual situations. You may want to choose five or six that you think get at the real issues involved here. You may want to prepare for the discussions in advance by having information available from your school district science standards, your state science standards and the National Science Education Science Standards.

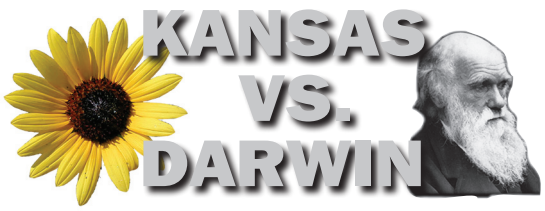
It is assumed the use of the film will cover a 45- 50 minute period and will include the film segments A New Definition of Science and The Conspiracy.

Time allocations might be:

- 5 minutes to distribute materials
- 10 minutes to read student materials on introduction and to preview the matching exercise. It should not be completed until after the film segment is shown. At this time you should clear up any misunderstandings of what the students are asked to do.
- 20 minutes to run this film segment. At this point, answer questions only on procedures. Avoid anything controversial.
- 10 minutes to complete the matching exercise and the question at the end. You may want to use some small group work as the students fill in the answers. It is important that the students match the highlighted items to the positions before they discuss whether they agree or disagree with the position of the statement.
- 10 minutes to provide the key of answers.
- undetermined minutes to correct misunderstandings and to discuss the validity of the various highlighted positions. The teacher on an individual basis must determine the amount of time he or she can give to the discussions. Try to keep the discussions on what science is and how it functions. This is a wonderful opportunity to help the students become more science-literate. This is also addressed in the National Science Education Standards. If you don't have time to discuss all the highlighted items, you might want to collect the student sheets. The answers might be interesting and enlightening as you plan for lesson three which follows.

Answer Key for Matching

1. X
2. X
3. O
4. O
5. X
6. X
7. O
8. O
9. X
10. X
11. O
12. O
13. X
14. O
15. X
16. X



STUDY GUIDE
Lesson Three

TO THE STUDENT:

By completing the activities in Lessons One and Two you identified the main subjects, their organizations, and their positions on the definition of science and on the teaching-evolution controversy. This understanding provides a valuable foundation. In Lesson Three, this background will better help you focus on the conflict of religious and scientific viewpoints as presented in the film.

The exchange of the ideas and views of each side may impact your own views positively or negatively. Now is the time for you to get more involved by responding to the 12 statements below which represent in some cases, extensions of the major ideas presented in the film. You will then have an opportunity to compare your views to those of others in class for fun and intellectual stimulation.

EXPRESSING YOUR VIEWS

Read the twelve statements below. Circle A if you agree, D if you disagree or U if you are undecided. Add a comment after each item to help support your position. Following item 12, you are welcome to add more statements that you feel should be considered.

1. Creationists reject science facts because they contradict their religious beliefs, not because of the strength of their conflicting evidence.

A D U

Comment:

2. Science as taught in America today reflects a view that the natural world is understandable, testable and predictable. Once supernatural explanations are given, this takes it beyond the natural world to the supernatural.

A D U

Comment:

3. There are huge amounts of science evidence to support the Theory of Evolution and NO science evidence to support Intelligent Design (ID). In fact, ID has been ruled to be religion by the Supreme Court of the U.S.A. Since ID is religion, not science, it should not be taught as science in public school classrooms.

A D U

Comment:

4. Students don't have to accept evolution in order to understand its importance as a unifying theme in all of science including biology, astronomy, medicine, earth science, etc.

A D U

Comment:

Lesson Three (continued)

5. The scientific community is obliged to respect those who don't accept evolution.

A D U

Comment:

6. Public school teachers should teach science as it is generally practiced by the world scientific community even though it is controversial to some religious beliefs.

A D U

Comment:

7. Teaching alternatives to evolution in public school would appease Muslim terrorists.

A D U

Comment:

8. Boycotting the Kansas Board of Education hearings on evolution was an effective way for the pro-evolutionists to make their point.

A D U

Comment:

9. Responding to public pressure is not an effective way to determine what should be taught in schools including evolution, sex education, nutrition, math, etc.

A D U

Comment:

10. Intelligent design and other challenges to evolution should be taught in comparative religion, political science, or philosophy classes, but not in science classes.

A D U

Comment:

11. Whether we teach evolution in public schools will definitely affect students' meaningful understandings of the nature of science and how it is influences society and how society influences science. Further, a lack of student understandings of how science is conducted will hinder their ability to function effectively as citizens in the highly scientific and technological society of the future.

A D U

Comment:

12. We should accept evolution because there is abundant and valid scientific evidence that has been verified through rigorous testing and questioning. Both of these are necessary for information to become a part of the body of science knowledge.

A D U

Comment:

13. your ideas

14. your ideas

TO THE TEACHER:

This film segment begins with the heading, “Confused,” about half way through the film. Distribute the student forms before starting the film and let them preview what they will see and what they will be thinking about.

This film segment lasts about forty two minutes, allowing perhaps fifteen minutes for distributing forms and answering questions.

As the teacher, you will need to modify the materials for your situation. The data from the student responses would be useful to you if you decide to do an extension activity.

EXTENSION EXERCISE:

The film maker has done a good job of presenting both sides of this controversy. In his introduction he features individuals who discuss issues that merit extended consideration. Based on those views you could form small groups of students to discuss the following:

The Board Hearings were a failure and a waste of tax payer’s money.

Let the group debate its pros and cons.

The pros are bound to mention the high costs, thousands of dollars for attorney fees, travel, honoraria, lodging, etc. for the presenters, waste of time (several days), combined with the fact the changes that favored Intelligent Design were reversed, and the months of the work by the majority of the expert science writing team was largely ignored and in some cases were falsely discredited.

The cons would mention such things as the publicity it gave to Kansas--achieving notoriety as being seen at the center of the evolution controversy. Showing that scientists are afraid to debate the issues involved in evolution.

Additionally, this film brings up huge numbers of ideas for thought and discussion. Not all of them are given here. Below are some of the additional ideas that could be extensions from the film. They involve higher levels of thinking. They provide the basis for discussion and application of many of the main issues presented or implied in the film. There are others that you may want to add to the list and share with others. Space has been left for you write in your ideas.

IDEAS TO THINK ABOUT (JUST "FUEL" FOR THOUGHT)

1. If we cannot give supernatural explanations to fill science knowledge gaps, scientists must find natural explanations, now or in the future.

2. If there was validity to Intelligent Design, it would be peer reviewed and be recorded in science publications and become an accepted part of science knowledge.

3. An understanding of evolution will provide answers for how micro-organisms, such as bacteria, become drug resistant.

4. If you can't find God in the world we understand, how do we expect to find God in the world we don't understand? This is a good reason to bring science and religion together to better understand the world.

5. The expansion of scientific understandings into such areas as political science is much different than the intrusion of religion into science. One moves from inside out; the other from the outside in.

6. Because science is based on evidence which provides solutions to some of the problems of the world, it will likely survive the battle with Intelligent Design.

7. Evolution is based on change in living things. This concept has expanded in meaning faster than many people's perception of it.

8. The controversy in Kansas is largely an issue between political power and the Power of a Methodology (science) which is accepted universally among mainstream scientists.

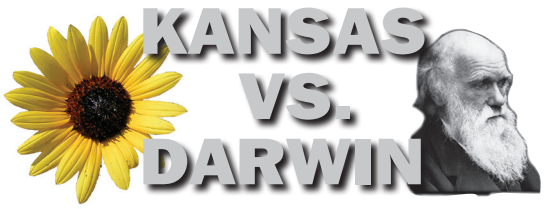
9. Kansas, because of its perceived unique life style and citizenry, should have a different concept of science than any other states.

10. The explanation of evolution in the revised Kansas Science Education Standards as written by the science experts runs counter to that in the National Science Education Standard.

11. Your ideas

12. Your ideas

13 Your ideas



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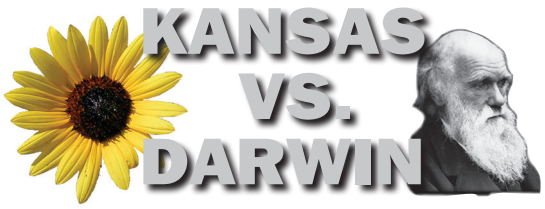
Three highly useful websites:

pbs.org/evolution (contains free videos for students and teachers available through streaming)

National Center for Science Education, Defending the Teaching of Evolution in Public Schools (ncse.com) This site has questions and answers about teaching evolution, publications, and information about science and religion.

www.biointeractive.org Access to all the Howard Hughes Medical Institute free DVDs (a must see).



About the Authors of this Guide

Richard M. Bingman was a teacher for over 30 years at high school, college and graduate school levels. He graduated from Temple University, Philadelphia, PA in 1967 with a Doctorate in Science Education. He was the director and co-developer of the Inquiry Role Approach, a curriculum program for Biology Teachers and Students, published by Silver Burdette in 1974. Currently retired, he resides near Springfield, MO

Kenneth J. Bingman has taught Biology, Biology 1, Honors, College Now, and AP Biology for 47 years. He graduated from Kansas University with a Bachelor of Science degree in 1963, and received a Master of Biology degree from Emporia State University, Emporia, KS in 1966. Starting in early 1990s, he worked extensively on writing and re-writing the Kansas State Department of Education Science Standards during the ten years they were being challenged by the conservative majority of the Kansas School Board.

He was also on the committee that developed the National Science Education Standards under the direction of the National Academies of Science, Washington, D.C.

He currently teaching AP Biology at Blue Valley West High School in Overland Park, Kansas.