

A Pedagogical, Legal, and Scientific Insight to the Teaching of Origins: Evolution and Intelligent Design (ID) in Public High School

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Politicized Scholars
 Put Darwin's Believers
 On Defensive in Debate

Science

What is Science and is it Defensible?:

Science:

- Relies on natural law to explain things.
- Can be falsified (proven wrong through empirical, materialistic research).
- Invokes observables
- Is testable.
- Makes predictions.
- Provides mechanisms.
- Can be used to solve problems or make predictions.

Philosophers of science are unified in noting that none of the above definitions of science, or demarcations, can not be proven to be "right" or 100% defensible.

Evolution as Scientific Theory and Fact, Stop Confusing Them (Meyer and Keas):

- Change Over Time... Fact
- Changes in frequencies of alleles over time... Fact
- Limited Common Descent... Fact
- Mechanisms for Limited Common Descent... Fact (But where's the line?)
- Universal Common Descent and Biogenesis... Theoretical
- "Blind Watchmaker" Thesis... Not Even "Scientific"

Creation Science is not ID Theory (DeWolf et. al.):

Creation Science

- The universe, energy, and life was suddenly created from nothing.
- Mutations and natural selection are insufficient to bring about all living things.
- Changes in originally created organisms has fixed limits.
- There is a separate ancestry for humans and apes.
- Earth's geology can be explained via catastrophism.
- The earth has a relatively recent origin (on the order of 6,000 years).

Intelligent Design

- High information content and irreducible complexity constitute strong indicators of past intelligent design.
- Biological systems have high information content and use subsystems that manifest irreducible complexity.
- Naturalistic mechanisms or undirected causes do not suffice to explain the origin of information or irreducible complexity.
- Intelligent Design is the best explanation for the origin of information and irreducible complexity in biological systems.



What does teaching the controversy do to truth?

Gerald Graff (Ph.D., English professor) – "teaching the conflicts has nothing to do with relativism or denying the existence of truth." (DeWolf et. al.)

Alan Cromer (physicist and science educator) – "... Constructivism is a postmodern antisience philosophy It's a form of subjective empiricism that puts its emphasis on the thoughts of the knower and views the search for truth as an illusion...." (http://www.edexcellence.net/doc/05sci_Introduction.pdf).

Can ID be presented in the Biology classroom?

Science is provisional and a discipline that promotes both inquiry and critical thinking.

Science continually crosses lines of other areas, such as ethics, and does so using controversy-based approaches.

Darwin himself referred to many design arguments in his arguments for descent.

The design vs. descent argument is a naturally occurring controversy that is unavoidable when talking about different theories of evolution.

Abstract

What is Intelligent Design? What is evolution? Though there are vast political and social forces behind these movements what happens when the arguments are evaluated independently? The arguments over design v. descent have risen and fallen over the last few hundred years. Intelligent Design asserts that there are certain irreducibly complex systems that require a Creator of some sort to exist. It uses theories developed in criminology and invokes them on the earth. Evolution is a hypothetico-deductive approach to looking at nature invoking a testable, naturalistic worldview. The goal of this study was to determine a set of guidelines for high school teachers who teach evolution and focused in on the scientific, legal, and pedagogical factors involved with how to address Intelligent Design in the public classroom. First-year students at Drake in the FYS entitled "Religion and Science" were surveyed about their views on evolution and intelligent design and how they were used in science and evolution. Results showed that the majority of students still believe in some form of creationism though maybe not the strictly Biblical form. Teachers should use three general principles when discussing Intelligent Design in the science classroom: (1) Understand the audience (students, parents, and the local community), (2) Help students understand the historical and philosophical development of science, and (3) Use controversy-based approaches emphasizing no right answers only well-supported ones.

Legal

Tinker v. Des Moines Independent Community School District (1969) (Morrison)

Teachers and students do not take off their constitutional rights to freedom of speech when they enter the school doors. Removing a book that a school board may not agree with results in the suppression of ideas and is in violation of the constitution. This case suggests there may be free speech laws protecting ID.

United States v. Kauten (1970) (DeWolf et. al.)

Religion is defined as a term that "is found in the history of the human race and is incapable of compression into a few words."

Lemon v. Kurtzman (1971) (Morrison)

Devised the *Lemon* test to provide guidance for how schools make a decision.

- Governmental actions must have a clear secular purpose.
- The primary effect of a governmental action must not be to promote or inhibit religion.
- The action must not result in "excessive entanglement" of government and religion.

Edwards v. Aguillard (1987) (Morrison)

Did not ban teaching about religion in science courses. It did prevent fundamentalist Christianity from including creation science due to Establishment Clause issues.

Frye v. United States (1989) or Daubert v. Merrell Dow Pharmaceuticals, Inc. (1993) (DeWolf et. al.)

In Frye's case, minority scientists were withheld in the courts as the court only would allow "majority science" into the court. This became known as the "general acceptance" test.

In Daubert's case the court allowed science so long as it was based on good sound evidence. This became known as the "evidentiary reliability" test.

Alvarado v. City of San Jose (1996) (DeWolf et. al.)

Three part test for religion:

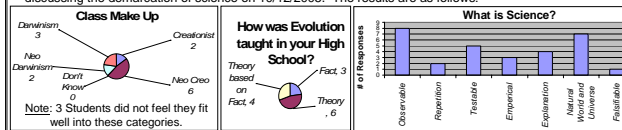
- Religion addresses questions which have to do with deep and imponderable matters and are fundamental in nature.
- Religion is comprehensive in nature (it is a holistic view and not a bunch of isolated teachings).
- Religion can be recognized by formal and external signs (i.e. ceremonies, structure, services, holidays, and propagation efforts)

Kitzmilller v. Dover Area School District (2005) (www.wikipedia.org)

Judge Jones issued his 139-page decision barring intelligent design from being taught in the science classroom because he rendered intelligent design as not being a science and "cannot uncouple itself from its creatorism, and thus religious, antecedents."

What are Drake's First Year Students Saying?

A survey was conducted with 13 students from Tim Knepper's FYS (Religion and Science) before they began discussing the demarcation of science on 10/12/2005. The results are as follows:



Pedagogy

Pedagogical Best Practice for Teaching Controversy (Meyer and Meyer):

Important Notes for Teachers

Keep in mind that **Your Job** and tenure may be at stake.

Students **NEED** and **WANT** to know how adults feel about issues important to them, particularly adults they hold in high esteem.

Pedagogical Guidelines

Students should learn about **ALL** sides.

Teachers must have **VERY** well planned lessons.

Students have the **RIGHT** to, without penalty to the student, not participate and be provided with an alternate activity. Parents and Guardians should have a say in the matter as well.

There is **NOTHING WRONG** with a teacher expressing their opinions so long as students know they can **disagree** without academic or social penalty.

Pedagogical Insight from an Evolutionist:

Steve Verhey, a biology professor from Central Washington University:

(http://www.pandathumb.org/archives/2005/12/teach_the_contr_1.html#more)

Steve defines his approach as "fairly standard pedagogical theory" noting that learning new things requires "connecting them with what we already know". He notes that many students of his have had "a hard-core biology undergraduate experience that ignored/dissed creationism". Steve notes below:

"I was applying basic educational theory to the issue of creationism/evolution by acknowledging that my students had heard of the issue before and had their own opinions which had value. I was recognizing that my students didn't arrive in my class cognitively ready to think effectively about such complex issues, and so I helped them toward that state of readiness. And, as much as I could, I allowed students to find their own way to their conclusions, so that they could have a greater sense of ownership of their ideas."

Verhey, also states:

"I don't know what to say about high school evolution education. I don't think my approach would work there. Perhaps it could work, but it would take too much time. Evolution can't be avoided in HS biology classes, and creationism/ID can't be presented as even vaguely valid alternatives, so we are where we are."

Implications for Public Education:

Guiding Principles for a High School Science Teacher:

1. Understand your audience (students, parents, community).

Always know your students, community, and school board.

Know if your students are developmentally and socially ready to handle a discussion on ID and Evolution. Build students up to the issue by using smaller issues that are more well known to foster a climate of respect.

Understand your students have beliefs that have value and are continually trying to make sense of the world they are growing up in.

2. Help students to understand the historical and philosophical grounds of science.

Help students to understand that science is provisional and also understand what grounds science uses to define itself and how those grounds may or may not be defensible.

Discuss what theories are scientific facts and how theories can use science to support them, though they are not considered hard science.

3. Know the most effective pedagogical method to use.

Multi-disciplinary learning engages student interest and is best accomplished through cross-curriculum planning (team teaching) with other teachers in the school.

A dogmatic representation of evolution in the presence of skepticism, no matter how scientific it is, does not promote student interest nor does it create a meaningful learning experience.

A controversy-based approach will increase student interest in subject matter and help promote life-long learning.

Help students to see that theories of evolution are facts and which ones have not been proven or are debated.