

Review of “Proposed Revisions to Kansas Science Standards Draft 1”
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I. Overview

A primary goal of the Kansas Science Standards, like the National Science Standards, is the development of scientifically literate students. All science teachers share this same goal.

Unfortunately, the proposed revisions would seriously undermine the efforts of Kansas science teachers to achieve this critical goal. While a few of the changes seem innocuous at first glance, upon reading the explanations and after considering the sum of those revisions it is clear that the cumulative effect would be to gravely weaken science instruction in the state of Kansas. In fact, it is clear that the result would be to have students question the validity of science as a way of understanding the world around them. Such an approach ignores the many benefits to be derived via the methods of science and, indeed, denigrates the afore mentioned goal of producing a scientifically literate citizenry.

As a successful, nationally recognized biology teacher with 27 years experience in the high school classroom, I am confident that the proposed changes represent poor pedagogy. They would hamper the ability of Kansas science teachers to be effective in their classrooms. Simply put, the revisions would be bad for Kansas science teachers and their students.

The authors of the proposed changes seek to alter the very definition of science itself. The authors frequently bemoan the fact that science relies solely on natural causes to explain natural phenomena. They wish to allow supernatural explanations to be considered within the realm of science. No reputable scientific organization would entertain such a suggestion. Having said that, let me be clear that scientists do not make any claim that events can only have natural causes, rather, they claim that the only causes we can hope to understand are natural ones. Science can make no claims whatsoever about supernatural causes. Therefore, supernatural causes have no place in a science classroom and opening the definition of science to include them would be counter to all accepted definitions of science.

The National Academy of Science and the National Association of Biology Teachers, to name just two of many such organizations, have clearly defined science as a process which can only consider natural explanations for natural phenomena. Claims which “do not refer to natural causes and cannot be subject to meaningful tests...do not qualify as scientific hypotheses.” (from the National Academy of Sciences, in *Science and Creationism*, 1999, pg ix, National Academy Press; can be found at

<http://books.nap.edu/html/creationism/>) “Experimentation, logical analysis, and evidence-based revision are procedures that clearly differentiate and separate science from other ways of knowing. Explanations or ways of knowing that invoke non-naturalistic or supernatural events or beings...are outside the realm of science and not part of a valid science curriculum.” (NABT’s Statement on Teaching Evolution, revised May, 2004; can be found at http://www.nabt.org/sub/position_statements/evolution.asp)

The proposed revisions to the commonly accepted definition of science are so far removed from the consensus views of scientists and science teachers that their inclusion in the state standards would seriously jeopardize the quality of science instruction in Kansas. Most troubling is the distinct probability that such changes would hamper students in their future quests for success in our increasingly technologically and scientifically advanced world.

II. Discussion of specific proposed revisions

1. a., b. and c. The intent of each of these revisions is to alter the definition of science, as discussed above, and should not be included. The original drafts of these sections are well written and will be very helpful to Kansas science teachers. Including the proposed revisions would weaken otherwise admirable statements.
1. d. The addition is unnecessary and misleading. The original statement is accurate and does **not** “lead students into believing that science is all-knowing...” The proposed revision weakens the description, attempting to cause students to doubt whether science has any validity.
2. a. Addition is not needed. The evidence supporting the statements in the original Teacher Notes is overwhelming. There is no need to add qualifiers here.
b. This is the first of several attempts by the authors to introduce discussions of historical hypotheses in a manner which lessens the importance of such explanations. Historical hypotheses are valid, important, and integral tools of science and students should not be given the impression that these methods are of little value. If Kansas science teachers are to achieve the goal of producing scientifically literate students, they must not be forced to include such distortions of the true nature of science.
3. The proposed indicator (#6) and accompanying additional specificity impose unreasonable expectations on both teachers and students. The addition of exercises in which students formulate and refute multiple hypotheses would be time consuming and serve no valid purpose. The only result of such activities would be the weakening of students’ confidence in scientific methods and explanations, again undermining the goals of science instruction.
4. These changes are especially misleading and confusing. The proposed insertion of 1. c. regarding nucleotides and natural law is very strange. The authors have either completely misunderstood or intentionally misrepresented James Watson’s intent in the passage being quoted. Dr. Watson was not addressing the “lack of any law...” He was, instead, describing why he and Crick were so sure that the “message” in DNA would have to be stored in the order of the bases rather than in

some other aspect of the molecule's structure. The quote has no bearing whatsoever on the claims made in 1. c.

5. More misinformation designed to weaken the state's standards on the teaching of evolution. First of all, the definition of evolution listed here is **not** found in the current NABT Statement on the Teaching of Evolution. The statement actually says in the "supporting materials" that "The diversity of life on earth is the outcome of biological evolution—an unpredictable and natural process of descent with modification that is affected by natural selection, mutation, genetic drift, migration and other natural biological and geological forces." The statement suggested for 2. f. is simply incorrect. Genetic Drift is **not** a part of natural selection. Genetic drift and natural selection are completely different mechanisms for producing changes in populations over time. All of the changes suggested in this section are solely for the purpose of weakening otherwise fine standards on the teaching of evolution. The purpose of such changes seems to be to cause students to question the validity of evolution. While students are certainly welcome to question any concepts being taught, it is the science teacher's role to provide those students with an understanding of the current, best, consensus views of the scientific community in all areas of science. These changes would undermine that objective. This is especially true with respect to those changes suggested for indicator 5 on the importance of evolution to biology. The indicator is true as originally written, as were the original "additional specificity" statements in 5 a. – c. The revisions would make a very good document a very poor one, leading to poorly educated students who would have a distorted view not only of evolutionary theory, but of science in general.
6. These changes present unnecessary intrusions. The new indicators for Benchmark 2 would not serve any valid pedagogical purpose. The changes would, once again, only serve to weaken science instruction. Science is a useful process which students must come to understand in order to be successful, productive citizens. Rather than making students more scientifically literate, these changes would do just the opposite.
7. None of the proposed changes to the glossary are grounded in any modern consensus view of science. These changes, too, would not be good for Kansas science teachers or their students.

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Award for Excellence in Science Teaching, Texas Medical Association, 1992

Distinguished Teacher, The White House, 1987