



Kansas State Board of Education
120 SE 10th Avenue
Topeka, Kansas 66612

Kansas Science Standards Summary of Changes

Kansas State Board of Education

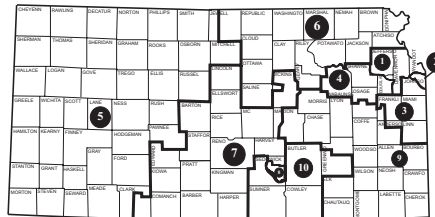
July 2006

Education Priorities for a New Century

To assist in fulfilling its responsibility to provide direction and leadership for the supervision of all educational interests under its jurisdiction, the Kansas State Board of Education has adopted as its mission promoting student academic achievement through vision, leadership, opportunity, accountability and advocacy for all. The State Board believes that the key to ensuring the fulfillment of its mission lies in helping schools work with families and communities to prepare students for success.

With that in mind, the State Board has established the following priorities to guide its work in the next century:

- **Ensure that all students meet or exceed academic standards by:**
 - **Redesigning the delivery system to meet our state's changing needs,**
 - **Providing a caring, competent teacher in every classroom,**
 - **Ensuring a visionary leader in every school,**
 - **Improving communication with all constituent groups.**



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7. What is the purpose of the Kansas Science Education Standards?

The purpose of the KSES is included in the introduction of the document and states the following:

“These standards, benchmarks, indicators, and examples are designed to assist Kansas educators in selecting and developing local curricula, carrying out instruction, and assessing students' progress. They will also serve as the foundation for the development of state assessments in science. Finally, these standards, benchmarks, indicators, and examples represent high, yet reasonable, expectations for all students” (p. iv, KSES, 2005).

Additional Specificity 3.3.7.a-c

“7. Some of the scientific criticisms include:

- a. A lack of empirical evidence for a “primordial soup” or a chemically hospitable pre-biotic atmosphere;
- b. The lack of adequate natural explanations for the genetic code, the sequences of genetic information

necessary to specify life, the biochemical machinery needed to translate genetic information into functional biosystems, and the formation of proto-cells; and

- c. The sudden rather than gradual emergence of organisms near the time that the Earth first became habitable” (p. 78-78, KSES, 2005).

6. What changes were made to the History and Nature of Science Standard?

The KSBE added the following to the Grades 8 – 12 History and Nature of Science section of the KSES approved November 8, 2005:

Additional Specificity 7.1.1

“Science is used by researchers to develop new medicines and by parents to promote the health of their families” (p 100, KSES, 2005).

Additional Specificity 7.1.2

“...articles in [scientific journals] and other peer reviewed literature” (p 100, KSES, 2005).

Additional Specificity 7.1.3

“Decisions the culture makes about bioethics and the use and extraction of natural resources are significantly impacted by scientific knowledge” (p 100, KSES, 2005).

Indicator 7.2.1

The student will understand scientific knowledge describes and explains the [The board added the following to this statement] “natural

world. Scientific knowledge is provisional and is subject to change as new evidence becomes available” (p 101, KSES, 2005).

Additional Specificity 7.2.1.b

“Science that is truly open-ended, and that allows evidence rather than preconceptions to guide explanation is the strongest and allows for constant refining and improvement of its explanations” (p 101, KSES, 2005).

Additional Specificity 7.3.1.b

Science progresses by incremental advances of scientists or teams of scientists. [The board added the following] “In addition, it progresses by critical analysis of: 1) properly collected data; and 2) existing theories and hypotheses, which can lead to major new scientific advances (e.g., relativity, plate tectonics, quantum theory, biological evolution)” (p 103, KSES, 2005).

1. What is the rationale of the Board for making these changes?

The Board provided the following rationale for their decision:

“Rationale of the State Board for Adopting these Science Curriculum Standards

We believe it is in the best interest of educating Kansas students that all students have a good working knowledge of science: particularly what defines good science, how science moves forward, what holds science back, and how to critically analyze the conclusions that scientists make.

Regarding the scientific theory of biological evolution, the curriculum standards call for students to learn about the best evidence for modern evolutionary theory, but also to learn about areas where scientists are raising scientific criticisms of the theory. These curriculum standards reflect the Board’s objectives: 1) to help students understand the full range of scientific views that exist on this topic, 2) to enhance critical thinking and the understanding of the scientific method by encouraging students to study different and opposing scientific evidence, and 3) to ensure that science education in our state is “secular, neutral, and non-ideological.”

From the testimony and submissions we have received, we are aware that the study and discussion of the origin and development of life may raise deep personal and philosophical questions for many people on all sides of the debate. But as interesting as these personal questions may be, the personal questions are not covered by these curriculum standards nor are they the basis for the Board’s actions in this area.”

2. Do the standards include Intelligent Design?

The following statements are found in the science standards:

“Evolution is accepted by many scientists but questioned by some. The Board has heard credible scientific testimony that indeed there are significant debates about the evidence for key aspects of chemical and biological evolutionary theory. All scientific theories should be approached with an open mind, studied carefully, and critically considered. We therefore think it is important and appropriate for students to know about these scientific debates and for the Science Curriculum Standards to include information about them. In choosing this approach to the science curriculum standards, we are encouraged by the similar approach taken by other states, whose new science standards incorporate scientific criticisms into the science curriculum that describes the scientific case for the theory of evolution.

We [the Kansas Board of Education] also emphasize that the Science Curriculum Standards do not include Intelligent Design, the scientific disagreement with the claim of many evolutionary biologists that the apparent design of living systems is an illusion. While the testimony presented at the science hearings included many advocates of Intelligent Design, these standards neither mandate nor prohibit teaching about this scientific disagreement.”

3. How has the definition of science changed from 2001 to 2005?

The Science Standards from 2001 used the following definition of science:

“Science is the human activity of seeking natural explanations for what we observe in the world around us” (p. 4, KSES, 2001).

The 2005 standards use the following definition:

“Science is a systematic method of continuing investigation that uses observations, hypothesis testing, measurement, experimentation, logical argument and theory building to lead to more adequate explanations of natural phenomena” (p. ix, KSES, 2005).

4. What changes were made in the Science as Inquiry Standard?

The KSBE added the following indicator to the Grades 8 – 12 Science as Inquiry section of the KSES approved November 8, 2005:

Indicator 1.1.6

“The student understands methods used to test hypotheses about the cause of a remote past event (historical hypothesis) that cannot be confirmed by experiment and/or direct observation by formulating competing hypotheses and then collecting the kinds of data (evidence) that would support one and refute the other” (p. 59, KSES, 2005).

Additional Specificity 1.1.6.a – c:

6. a. Formulate multiple hypotheses about a singular historical event and develops a “best current explanation” of what caused the event, such as the cause of a fire or death.
- b. Predict the kinds of circumstantial evidence that one would observe under each hypothesis.
- c. Collect evidence and draw an inference as to the best explanation and whether the evidence fits either hypothesis. Explains why either explanation cannot be entirely validated by a laboratory experiment” (p. 59, KSES, 2005).

5. What changes were made to the Life Science Standard dealing with evolution?

The KSBE added the following to the Grades 8 – 12 Life Science section of the KSES approved November 8, 2005:

Additional Specificity 3.2.1.c

“The sequence of the nucleotide bases within genes is not dictated by any known chemical or physical law” (p. 73, KSES, 2005).

Additional Specificity 3.3.1.a

“Biological evolution postulates an unguided natural process that has no discernable direction or goal” (p. 75, KSES, 2005).

Additional Specificity 3.3.1.c

“However, in many cases the fossil record is not consistent with gradual, unbroken sequences postulated by biological evolution” (p. 75, KSES 2005).

Additional Specificity 3.3.1.d

There are observable similarities (KSBE added the following to this statement) “and differences among fossils and living organisms” (p. 75, KSES, 2005).

Additional Specificity 3.3.1.f.i-iii

“f. The view that living things in all the major kingdoms are modified descendants of a common ancestor (described in the pattern of a branching tree) has been challenged in recent years by:

Discrepancies in the molecular evidence (e.g., differences in relatedness inferred from sequence studies of different proteins) previously thought to support that view.

A fossil record that shows sudden bursts of increased complexity (the Cambrian Explosion), long periods of stasis and the absence of abundant transitional forms rather than steady gradual increases in complexity, and

Studies that show animals follow different rather than identical early stages of embryological development” (p. 75-76, KSES, 2005).

Additional Specificity 3.3.3.d

“Whether microevolution (change within a species) can be extrapolated to explain macroevolutionary changes (such as new complex organs or body plans and new biochemical systems which appear irreducibly complex) is controversial. These kinds of macroevolutionary explanations generally are not based on direct observations and often reflect historical narratives based on inferences from indirect or circumstantial evidence” (p. 76, KSES, 2005)

Additional Specificity 3.3.6.c

“However, reverse engineering and end-directed thinking are used to understand the function of bio-systems and information” (p. 77, KSES, 2005).

Indicator 3.3.7

“The student explains proposed scientific explanations of the origin of life as well as scientific criticisms of those explanations” (p. 77, KSES, 2005).