

Guidelines for Content Advisor Feedback

Please review the proposed revisions to the Texas Essential Knowledge and Skills (TEKS) for

- the four high school courses: Biology, Chemistry, Integrated Physics and Chemistry (IPC), and Physics, and
- scientific process for kindergarten–grade 12 (scientific and engineering practices).

Use the following questions to develop feedback for the State Board of Education regarding revisions to the standards.

There is no specific format required for your feedback. When referencing specific portions of the TEKS, please indicate the course and specific letter/number of the standard and course to which you are referring, as appropriate. Feedback may be limited to specific courses; however, please specify in comments which course(s) is addressed.

GUIDING QUESTIONS- HIGH SCHOOL COURSES

1. Does each course follow a complete and logical development of science concepts presented? If not, what suggestions do you have for improvement? **yes**
2. Do the standards for the course(s) adequately address scientific concepts? If not, please give examples of how the standards might be improved. **yes**
4. Are there any gaps or concepts missing that should be addressed? Are there specific areas that need to be updated to reflect current research? **No glaring obsolescence or omissions**
5. Do the high school courses course(s) sufficiently prepare students for postsecondary success? If not, please provide suggestions for improving the standards. **yes**
6. Does each course include sufficient standards focused on laboratory and field investigation? **yes**
7. Are the student expectations clear and specific? If not, please give examples of how the language might be improved. **Comments placed in the documents and attached to this document.**
8. Are there student expectations that are not essential or unnecessarily duplicative and can be eliminated? If so, please identify by course and student expectation number, e.g., Physics 4.B. **See comments attached to this document.**

GUIDING QUESTIONS- SCIENTIFIC AND ENGINEERING PRACTICES

1. Are the student expectations in the science and engineering practices clear and specific? If not, please give examples of how the language might be improved. **Good integration**
2. Do the science and engineering practices sufficiently prepare students to engage in investigative and engineering design processes? If not, please provide suggestions for improving the standards. **Yes**
3. Are there any gaps or practices missing that should be addressed? **No**

Work Group Recommendations, Science TEKS
Ronald Wetherington, Content Advisor
19 August, 2020

This is my feedback on the final recommendations of two TEA work groups: the Scientific and Engineering Practices Work Group and Science TEKS Work Group B. As a content specialist in biology, my comments on the latter group's recommendations are restricted to that science. On the whole, I find that both work groups have done an admirable job of clarifying, further streamlining, and providing better focus on both the Knowledge and Skills statements and the Student Expectations.

Scientific and Engineering Practices. I support very strongly the recommendation to integrate engineering concepts into science education. It is appropriate to do this under Process Skills and to rename the strand, and I urge the SBOE to approve this recommendation. I likewise support the replacement/modified SEs which the group recommends. My few corrections follow:

(1)(D)(High School): the phrase "Use appropriate tools such as" is repeated and the repetition should be deleted.

(3)(Comments) [page 10]: "communication" should be "communicating".

(4)(A)(High School): The final phrase "so as to encourage critical thinking by the student" is not a student expectation *per se*, but rather serves as a parenthetical motivation/justification for the SE. A rationale for an expectation should not be incorporated into the expectation. I recommend that this be deleted.

Work Group B (Biology). The group has, in my opinion, done a superb job of narrowing the focus and highlighting the central idea in the KS section of the TEKS. My suggestions are confined to the Introduction:

(b) Introduction

(1)(Biology): "Students in Biology focus on patterns, processes, and relationships of living organisms through four main concepts:" What follows are not "concepts" but rather artificial categories into which the study of biology has been sliced. The silos of morphology, genetics, evolution, and ecology might better be termed *subfields*.

(2)(Nature of science): This replacement of the NAS statement is not adequate. It does not substitute for a *definition* of science; moreover, it does not even *describe* the "nature of science". While its emphasis on literacy is laudable, it begs the question of how scientific literacy is distinguishable from other forms of literacy. Students should at least be led to explicitly understand the critical importance of "testable explanations" and "natural phenomena" as limiting conditions. This is particularly important in the context of the final sentence that "some questions are outside the realm of science because they deal with phenomena that are not currently scientifically testable."

(B)(6): Change "Science is a series of cross cutting concepts. . ." to read "Science incorporates a series of cross cutting concepts. . ."

(B)(6) Change "models allow for boundary specification and a tool for understanding...." to read "models allow for boundary specification and provide a tool for understanding...."

(c) Knowledge and Skills

(9)(Science concepts) The last clause “that has multiple lines of evidence” should be changed to read “that involves multiple lines of evidence.”

(9)(A) Change “analyze and evaluate” to “explain”. This is consistent with recommended change in verbs for (10)(A) and (B). The working group’s rationale for 10B is valid for all of these changes.

(9)(B) The work group recommended wording is “examine gradualism and punctuated equilibrium as scientific explanations of abrupt appearance and stasis in the fossil record.” I recommend changing this to read “examine gradualism and punctuated equilibrium with respect to the fossil record.” The reason: “gradualism” is not an explanation for either “abrupt appearance” or “stasis” as this wording implies – it is rather the opposite of these. Furthermore, “abrupt appearance” and “stasis” are ambiguous terms, and thus too inexact for scientific description.

(10)(Science concepts) The last clause “that has multiple mechanisms” should be changed to read “that involves multiple mechanisms.”

(10)(B) Delete “and analyze” in the phrase “explain and analyze”. This is consistent with (9)(A), above.

(10)(C) Replace “analyze and evaluate” with “explain”, consistent with the preceding.

(10)(D) Place a comma after “recombination” in order to establish proper syntax.

(13)(D) Add the underlined clause: “explain how environmental change, including change due to human activity, affects biodiversity, and analyze how changes in biodiversity impact ecosystem stability.