



From: [Robert Cohen](#)
To: [ED, State Board of Ed](#)
Subject: [External] comments on the proposed PA science standards K-12
Date: Sunday, July 4, 2021 9:54:38 AM

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To: Pennsylvania State Board of Education
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I am writing to express my strong support for the adoption of the proposed PA K-12 science standards as a first step toward PA-specific expectations reflective of the crosscutting concepts and scientific practices essential for a science-educated populace. The standards have the potential to be a significant improvement over the current standards.

I say “potential” because two changes are needed to reach that potential, but the changes can be made either prior to or soon after approval. The first is organizational while the second is more substantial.

Recommendations:

1. Reorganize the standards

The proposed standards are presented in three documents. One document contains all of the content areas for the primary grades. Doing so is potentially very confusing, as the standards for science are written very differently than the other standards (environment and ecology, and technology and engineering). In particular, the standards for science match the performance expectations in the Next Generation Science Standards (NGSS) and, as such, are each written to reflect some aspect of all three dimensions (crosscutting concepts, scientific practices, and disciplinary core idea). The other standards are not. To make it clear that the standards must be interpreted differently depending on the content area, I recommend that the documents be reorganized by content:

1. **Science** standards for all grade bands
2. **Environment and ecology** standards for all grade bands
3. **Technology and engineering** standards for all grade bands

2. Emphasize the crosscutting concepts and scientific practices

As mentioned in recommendation #1, the science standards for all grade bands duplicate the Next Generation Science Standard (NGSS) performance expectations. I applaud this. Unfortunately, whereas the NGSS documents clearly state how the performance expectations reflect the crosscutting concepts and scientific practices, the proposed PA standards do not. Consequently, it will be too easy for teachers and schools to misinterpret the statements as content facts and explanations that must be

mastered rather than as examples that illustrate how students can utilize the cross-cutting concepts and scientific practices within the disciplinary core ideas. Such a result would run counter to the Framework for K-12 Science Education, from which the standards were constructed. To address this, the following should be added to the science standards document (#1a):

1. Language explicitly describing the cross-cutting concepts, scientific practices and disciplinary core ideas from NGSS (rather than just naming them);
2. Language explicitly stating that the goal must be on getting students competent in appropriately applying the cross-cutting concepts and scientific practices to the disciplinary core ideas (rather than just treating the crosscutting concepts and scientific practices as historical artifacts upon which the standards were built); and
3. Language clarifying how each performance expectation reflects the intended crosscutting concept, scientific practice and disciplinary core idea (as in Appendix B of the proposed standards but for all the performance expectations).
4. Examples illustrating how the disciplinary core ideas, crosscutting concepts and scientific practices can be applied to Pennsylvania-specific situations, environmental and ecological issues, and engineering and technological tasks. Such examples do not need to be tied to a particular performance expectation.

I strongly urge the state board of education to approve the proposed standards, either as amended according to my recommendations or on the condition that the recommendations are swiftly implemented soon after approval.

Note: The language in the Pennsylvania Bulletin also needs to be cleaned up (sometimes it says "Science, Environment and Ecology", sometimes "Science and Environment and Ecology" and sometimes "Science and and Environment and Ecology").

Sincerely,

Robert A. Cohen
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