Testimony in Response to LD 2182:
Revisions to the Maine Learning Results for Science

February 8, 2023

Senator Rafferty, Representative Brennan, and members of the Education and Cultural Affairs Committee, my name is Alison Riley Miller. I am a Brunswick resident and parent to two children in Brunswick Public Schools. I am also speaking today as an Associate Professor of Education at Bowdoin College, a researcher of science teaching and learning, and a Steering Committee member for the Maine Science Standards Review and Revision you are being asked to approve today. The opinions I am offering are my own and not an official statement on behalf of Bowdoin College, and they are informed by my decade of service in teacher education as well as my prior decade of service as a classroom teacher in both middle and high schools.

First, I want to be clear that the *Next Generation Science Standards*, adopted in Maine in 2018 with only minor formatting changes, but referred to as the Maine Learning Results for Science, is the gold standard for science teaching and learning in the United States. *The Framework for K-12 Science Education* from which the *Next Generation Science Standards* were developed, was published by the National Academies of Sciences, Engineering and Medicine, and was written by a committee of scientists, engineers, educational researchers, learning scientists, and policy experts. These standards were developed collaboratively across 26 Lead States, Maine included, and synthesize decades of research about teaching and learning. The NGSS represents a substantive and positive shift around science learning, moving students from content heavy "learning about" to inquiry heavy "figuring out" the world around them. This shift is a significant and necessary step in preparing students as scientifically literate citizens, able to confront and reason through the multiple challenges facing this generation and generations to come. I want to establish my unwavering support for the Maine Learning Results for Science (NGSS) as they were adopted in 2018 and this testimony is intended to defend the integrity of those standards as well as the time and resources teachers have invested in teaching with them.

I have written to you before and I am here to speak with you today because I am deeply concerned about both the *process* I have been asked to participate in during the Science Standards Review, and about the *substance* of the proposed changes to the standards that you are being asked to approve.

You will find my concerns about the *process* of this review and revision outlined in the written testimony I've provided to you today, but for the sake of brevity I want to highlight just a few of the critical problems with the *content* of the revisions you are being asked to approve. I am asking that you reject those revisions, allowing science teachers in Maine to continue the hard work of aligning their curriculum to the standards as they are currently written and engaging in the professional learning it takes to fully implement the vision for student learning set forth in those standards.

Summary points

- Virtually all of the public comments solicited by the MDOE said to not make any substantive changes to the science standards. The current standards were adopted in 2018, so implementation only began in the 2019-2020 school year. Teachers barely began how to aligning their curricula and implementing the standards before finding themselves in the midst of a global pandemic. Fully-aligned instructional materials for teaching with the current MLRs for Science (NGSS) are just now becoming widely available and the MDOE reorganized to eliminate content specialists, so no substantive resources or support have been offered to teachers since the initial introduction of these standards five years ago.

- The revisions the MDOE has proposed add content to the science, technology and engineering standards for which no teachers of science have received any training. This content is in African American studies, Wabanaki studies and genocide.

- This review was meant to be of science standards. Standards define what students should know and be able to do based on their curriculum and instruction. While African American studies, Wabanaki studies and genocide are undoubtedly important things for students to understand, the learning **standards** – what students should know and be able to do – for African American studies, Wabanaki studies and genocide have not been determined. Instead, topics from these areas have been shoehorned into existing standards documents as examples that teachers may choose to bring in while addressing a particular science standard.

- For context, the Next Generation Science Standards were developed over several years as part of a multi-state and multi-institution collaboration. They have been through extensive peer review. I have nothing but respect for the teachers on the Writing Committee convened this summer by the MDOE, but they were charged with making substantive additions to the standards over approximately four days. How can we expect those revisions to withstand review and critique?

- Some of the revisions the MDOE has inserted in the science standards, e.g., how genocide interplays with the Holocaust and anti-Semitism, require a deep and nuanced understanding of the content as well as a firm grasp on the developmental readiness of students to grapple with these concepts. These are critical and delicate topics, and Maine's science teachers have not been provided with, nor is there a plan to provide them with the training to do this well.

Finally, I want to offer just two critical pieces of information about the process for the revisions you are being asked to approve.

- The process of decision making and communication have been veiled in secrecy. The Steering Committee was told what changes were to be made. These were reported to us as "essential agreements" which, ironically none of us agreed to. We were told that the scope of our work was not to offer opinions or critique of the mandated revisions despite the overwhelming public comment that asked that only egregious errors be corrected if any existed. In short, many members of the Steering Committee, myself included, do not agree with the very revisions that are being attributed to us.

- Further, when the draft science standards revisions were released in the fall, comments were requested. These comments were never posted publicly despite requests for transparency, and I truly do not know or trust how the MDOE has dealt with them.

I am speaking to you in the spirit of transparency and collaboration as I believe all of those involved in the review of the Maine Learning Results for Science ultimately want to do what is best for teachers and students in Maine. However, I believe that a process so flawed and obfuscated has resulted in revised standards that are also flawed and bound to confuse and frustrate the teachers and students we are here to advocate for and support.

It is with all of this in mind that I urge you to carefully consider whether the current revisions to the Maine Learning Results for Science represent responsiveness to the needs of Maine's teachers and students. I believe that the integrity of these standards and the ability of teachers and districts

to use evidence-based and open-source curricular materials to teach and assess science learning is dependent on our continued close alignment with the NGSS and on this committee rejecting any revisions that would impede that alignment and implementation.

Thank you for your time and consideration.

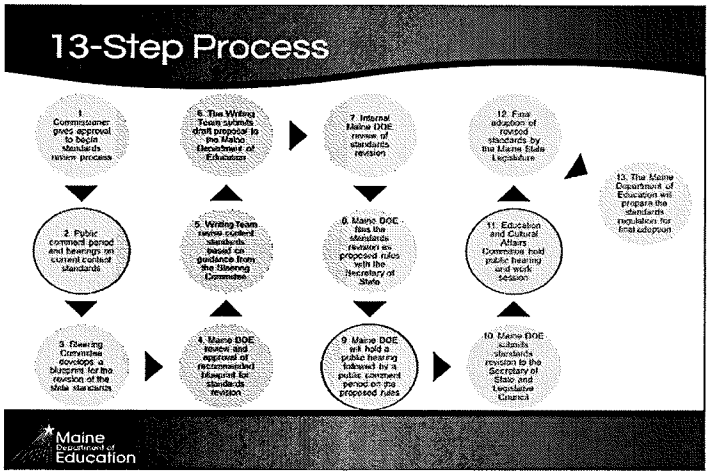
Further details are provided below.

The process has been flawed and lacked transparency throughout.

The Steering Committee charge as stated on the MDOE website is to:

- review all comments submitted during the initial public comment period;
- develop a blueprint for the revision of the state standards in their assigned content area;
- address and advise the writing committees when deadlocks occur; and
- determine when the writing teams have completed their work and the standards are ready to be moved on to the next step in the process.

Steering Committee members were offered an "orientation" via PowerPoint presentation before our first meeting where the process for standards review and revision was clearly laid out. I am including a few screenshots from the slide presentation as they are germane to my comments on the process and will focus on the first two bullet points in the charge outlined above.

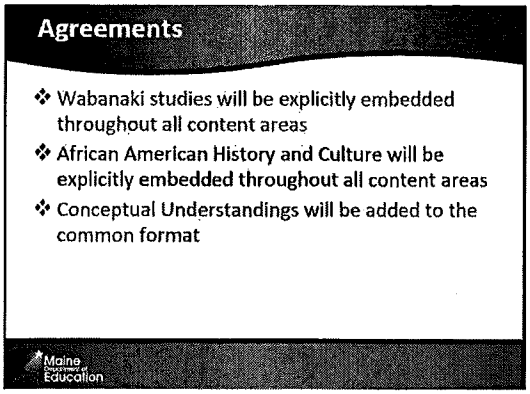


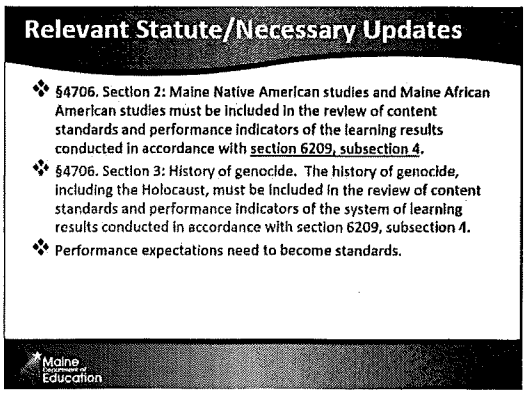
The process begins at step 1 with the Commissioner giving approval to begin the standards review. Step 2 in the process outlined by the MDOE states "Public comment period and hearings on current content standards". The next step (Step 3) states, "Steering Committee develops a blueprint for the revision of the state standards.

In between those two steps (Steps 2 and 3), MDOE staff inserted an additional step which I believe amounts to an overreach of their authority. I will outline my concerns in the paragraphs that follow.

In the same PowerPoint orientation that Steering Committee members were shown, MDOE representatives defined the scope of our work together and repeatedly referred to several "essential agreements". We were informed that these "agreements" were not up for our review or critique and, when we pushed back on some of those MDOE mandates, couched as "agreements", MDOE staff informed Steering Committee members that if we refused to provide guidance to the Writing Committee about how to integrate these MDOE mandates into the revisions of the Science Standards then the MDOE would simply have the Writing Committee move ahead with the revisions without our guidance.

The "agreements" and "relevant statutes / necessary updates" we were presented follow:





The Steering Committee included only one science teacher and one computer science teacher. The rest of the Committee members were representatives from higher education, and nonprofit institutions, plus two members of the Wabanaki Federation. We were joined by four MDOE staff members.

The revisions contain inaccuracies, are potentially misleading, and require professional development and funding that have not been planned for or allocated.
The Steering Committee agreed that Wabanaki studies and African American studies in Maine could be folded into *relevant* standards within the Maine Learning Results for Science while preserving the integrity of the *Next Generation Science Standards* (Lead States, 2013), and recommended that the Writing Committee add relevant, place-based examples related to Wabanaki studies within the parenthetical examples given in *relevant* performance expectations (For example, the "Further explanation" statement for HS-PS4- 1 "Use mathematical representations to support a claim regarding relationships among the frequency, wavelength, and speed of waves traveling in various media" includes the following: possible examples: African musical instruments, rainbows, optical illusion as objects are inserted into water, and Wabanaki experience of how to aim when spearfishing or weir fishing due to the refraction of light).

While some of the examples from Wabanaki studies and African American studies included in the revisions are relevant and clearly related to the standards, others seem to miss the intention of the standards as written (For example: HS-PS1-1 "Use the periodic table as a model to predict the relative properties of elements based on the patterns of electrons in the outermost energy level of atoms" includes an example in the "Further explanation" section that says, "Consider connecting the predictive nature of the periodic table with the predictive nature of Wabanaki seasonal activities (moon cycle)". This is a stretch and I believe it misses the intent of the physical science standard.

The second set of "agreements" the Steering Committee was presented with seems like an overly broad interpretation of the legislative intent of Statute 4706 sections 2 and 3. To mandate that a Science Standards Writing Committee find places to shoehorn in the study of genocide, seems to me, at best, misguided and, at worst, malpractice. Without specific resources, and professional development for science teachers, how are complex historical and political topics like genocide going to be integrated with any substantive context or obvious connection to a science learning outcome?

It cannot be overstated here that the first charge of the Steering Committee was to review feedback from the public comment period. Of the fifteen recorded public comments on the Science Standards, eleven of them resoundingly asked the MDOE to "stay the course" with the standards as they are written. These folks noted that teachers had only begun to implement teaching with the *NGSS* (MLRs for Science) in the fall of 2019 and then spent the next two years struggling to teach through a global pandemic. Overwhelmingly, the feedback I've heard both through public comment and through my position as a teacher educator at Bowdoin, is that what teachers want is an opportunity to learn about and implement three-dimensional learning as envisioned in the NGSS and for the MDOE to provide opportunities for professional learning and support for science teachers in the form of a state-level science education expert. My experience on the Steering Committee is that the MDOE has completely disregarded public comment and the repeated concerns raised by Steering Committee members who were chosen precisely because we are experts in the field of science education.

I am writing to you in the spirit of transparency and collaboration as I believe all of those involved in the review of the Maine Learning Results for Science ultimately want to do what is best for

teachers and students in Maine. However, I believe that a process so flawed and lacking transparency has resulted in revised standards that are also flawed and bound to confuse and frustrate the teachers and students we are here to advocate for and support.

It is with all of this in mind that I urge you to reject the current revisions to the Maine Learning Results for Science on behalf of Maine's science teachers and students.

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