TO: P-12 Education Committee

FROM: Angelica Infante-Green

SUBJECT: New York State P-12 Science Learning Standards

DATE: June 6, 2016

AUTHORIZATION(S):

SUMMARY

Issue for Discussion

This item will present the Board of Regents with revised New York State P-12 Science Learning Standards for consideration, highlight revisions made to the draft set of NYS P-12 Science Learning Standards based on stakeholder feedback, provide suggestions from the field related to local school district implementation of new science learning standards, and propose next steps in the development and transition process.

Proposed Handling

This issue will be before the Regents P-12 Education Committee for discussion at the June 2016 meeting.

Background Information

In January 2015, the Board of Regents approved the Statewide Strategic Plan for Science and directed the Education Department to develop new draft New York State P-12 Science Learning Standards. The item presented to the Board may be accessed online at http://www.regents.nysed.gov/common/regents/files/115p12a1.pdf.

In March 2016, the Board discussed the process undertaken to develop the draft NYS P-12 Science Learning Standards and feedback from an online public survey posted in December 2015. The item presented to the Board may be accessed online at http://www.regents.nysed.gov/common/regents/files/316p12d1.pdf.

Quantitative results from this survey showed:

- Collectively, three out of the four key categories – Organization of the Standards, Coherence, and Content and Rigor – on average, were rated by approximately 3/4 of the valid respondents as "adequately meet this criterion" or "meet this criterion to a great extent." The fourth category, Clarity and Specificity, was identified as an area in need of refinement.
- 15 of the 21 criteria used in the survey were rated by more than 2/3 of the valid respondents as "adequately meet this criterion" or "meet this criterion to a great extent."

Qualitative feedback from valid respondents showed:

- General support for considering the adoption of the draft NYS P-12 Science Learning Standards with pertinent guidance and relevant clarifications.
- A call to articulate a timeline to address the critical components of the Statewide Strategic Plan for Science, especially pertaining to:
    - Professional development for P-16 teachers and leaders,
    - Teacher certification and pre-service teacher education programs,
    - Curriculum and instructional resources,
    - Assessments in science,
    - Fiscal support for local implementation, and
    - Community awareness and support.

The Process to Create the New York State P-12 Science Learning Standards

The original draft NYS P-12 Science Learning Standards have been posted on the Department website since November 2015 at http://www.p12.nysed.gov/ciai/mst/sci/nys-p12-science-ls-intro.html. In general, the 2015 survey data indicates strong support for these standards. Feedback received has been reviewed and analyzed by Department staff, members of the Science Education Steering Committee, and other science education stakeholders. As a result, the draft was revised and specific changes are reflected in the updated version of the NYSSLS.

These include revisions to:

- One Performance Expectation in middle school related to growth, development, and reproduction of organisms;
- One Disciplinary Core Idea in middle school related to structure and the properties of matter;
- One Disciplinary Core Idea in high school related to energy;
- Two Disciplinary Core Ideas in high school were omitted related to forces and interactions and energy;
- One Cross-Cutting Concept in high school related to energy; and
- One Cross-Cutting Concept in high school related to matter and energy in organisms and ecosystems.

The revised set of New York State P-12 Science Learning Standards may be accessed at http://www.p12.nysed.gov/ciai/mst/sci/nyssls.html.

The Science Education Steering Committee (SESC) convened in early March 2016 to review feedback related to the draft NYS P-12 Science Learning Standards collected via the 2015 survey. All committee members present at the two-day meeting had an opportunity to review quantitative data and qualitative feedback submitted by survey respondents. The SESC provided the Department with trends in the feedback. Disaggregated by key category, the following trends were identified:

- Organization of the Standards
  - the need for teacher professional development aligned to the NYS P-12 Science Learning Standards along with guidance on harnessing the strength of the NYS P-12 Science Learning Standards' architecture.
- Coherence
  - the potential for three-dimensional learning (Science and Engineering Practices, Disciplinary Core Ideas, Crosscutting Concepts), connecting learning across science disciplines, and utilizing science instruction to bolster achievement in mathematics and English language arts.
  - the critical need for professional development related to incorporating engineering into science instructional practices.
- Clarity and Specificity
  - the importance of professional development focused on local curriculum and state and other forms of assessments to ensure consistency.
  - grade-by-grade articulation of the middle-level standards.
  - discipline specific standards for high school chemistry and physics.
- Content and Rigor
  - overall support for the draft NYS P-12 Science Learning Standards.
  - teachers professional development, especially at the elementary-level, related to the three-dimensional learning provoked by the NYSSLS.
  - the need for curriculum development guidance, assessment samples and exemplars, fiscal support for materials and other resources, and administrative and community support to ensure quality science instructional programming resulting in enhanced student achievement of the NYSSLS.

Structure of the new NYS P-12 Science Learning Standards

The new NYS P-12 Science Learning Standards are organized by topic areas associated with the physical sciences, life sciences, and Earth and space sciences. The standards are grade-by-grade for prekindergarten through grade 5 and grade banded for grades 6-8 and 9-12. The structure includes sets of related Performance Expectations. Each Performance Expectation may have a Clarification Statement and an Assessment Boundary.

Each set of Performance Expectations is followed by Foundation Boxes. The Foundation Boxes include Science and Engineering Practices, Disciplinary Core Ideas, and Crosscutting Concepts to further define the Performance Expectations.

The Foundation Boxes are followed by Connections Boxes that include connections to other Disciplinary Core Ideas within the same grade level, articulations of Disciplinary Core Ideas across grade levels, and connections to New York State's Learning Standards in Mathematics and English Language Arts & Literacy.

The new NYS P-12 Science Learning Standards align with science education and current cognitive research on how students learn science. These standards call for three dimensional learning that include increased opportunities for students to engage with natural science phenomena.

Local Curriculum Transition

As teachers, schools, and educational systems systemically transition to the new science standards and changes to local curriculum and instructional practice, a call for coherent professional development opportunities is vital. To this end, the Department will continue to collaborate with science education stakeholders across the state and nation to assist in building the awareness and the capacity of teachers and leaders of science at the local, regional, and state levels, focusing on the components of the Statewide Strategic Plan for Science with the overall intent of collectively enhancing student achievement of the new NYS P-12 Science Learning Standards.

State Assessment Transition

In as much as the NYS P-12 Science Learning Standards call for enhancing teaching and learning in science, these standards also necessitate changes to student assessment. Both local and state-level assessments will need to be developed to measure the learning expectations included in the standards. As the new standards focus on three-dimensional learning – Science and Engineering Practices, Crosscutting Concepts, and Disciplinary Core Ideas – so too should the local and state-level assessments used to evaluate student achievement of the standards. This shift in assessment requires a deliberate transition period with continuing science education stakeholder communication and input.

Currently, the NYS P-12 Science Learning Standards are presented as topic areas that fall into Physical Sciences, Life Sciences, and Earth and Space Sciences. The Performance Expectations are presented grade-by-grade for prekindergarten through grade 5, grade banded for grades 6-8, and grade banded for grades 9-12.

State-level assessments are proposed for grade 5, grade 8, and for each of the current disciplines assessed with science Regents examinations – chemistry, Earth science, living environment, and physics. This configuration of exams mirrors the current exams in New York State, with the exception of a change to the elementary level science exam from grade 4 to grade 5. To build these new exams, several issues must be addressed and settled, with contributions of science education stakeholders. These issues include:

- Determining the Performance Expectations assessed on the grade 5 examination (e.g., will this be a comprehensive exam including expectations from PreK through grade 5, grades 3-5, or just grade 5?).
- Determining the Performance Expectations assessed on the grade 8 examination (e.g., will this be a comprehensive exam including expectations from grades 6-8 or just grade 8?).
- Determining the Performance Expectations assessed on each high school Regents science examination and, thus, determining course expectations for those high school courses (e.g., what Performance Expectations will be assessed on each exam?).

Proposed Transition Strategy

Timeframe	Task
Summer and Fall 2016	Engage relevant stakeholder groups to outline a more detailed transition strategy for the new NYS P-12 Science Learning Standards in alignment with the Statewide Strategic Plan for Science.
Fall 2016	Present NYS P-12 Science Learning Standards to Board of Regents for final adoption.
2016-2017 School Year	Collaborate with relevant stakeholder groups to build awareness of the new NYS P-12 Science Learning Standards across the state. Develop and propose assessment frameworks.
2017-2018 School Year	Continue collaboration with relevant stakeholder groups to build awareness and build capacity around new NYS P-12 Science Learning Standards; local implementation begins. Assessment development tasks focus on item prototyping and some early item writing.
2018-2019 School Year	Continue collaboration with relevant stakeholder groups in fidelity with the Statewide Strategic Plan for Science; continue local implementation. Assessment development tasks focus on item writing and ancillary test development activities (e.g., rubric development, scoring guidance).
2019-2020 School Year	Continue collaboration with relevant stakeholder groups in fidelity with the Statewide Strategic Plan for Science; continue local implementation. Assessment development tasks focus on final item writing for items that will populate the initial 2020-21 test, test development, and field testing grades 5 and 8. A question sampler and public information on the assessment framework would be released for grade 5 and 8 exams if those exams are administered operationally the following year.

2020-2021 School Year	Re-examine the Statewide Strategic Plan for Science and revise, as appropriate. Earliest possible administration of a state-level grade 5 science assessment and a state-level grade 8 science assessment based on NYS P-12 Science Learning Standards. Assessment development continues for grades 5 and 8, field testing of Regents exam items begins.
2021-2022 School Year	Proposed administration of new science Regents examination(s) based on NYS P-12 Science Learning Standards – Assessment development continues.

Next Steps

At the direction of the Board of Regents, Department staff and science education stakeholders will continue to collaborate on the transition to new New York State P-12 Science Learning Standards in fidelity with the Statewide Strategic Plan for Science. The new standards will be brought back to the Board in fall 2016 for final adoption, and at that time the Department will provide an update on the implementation of curriculum across the state and the status of new assessment development activities.

Appendix A – Science Education Steering Committee

Science Education Steering Committee (SESC) – convened by SED to provide advice regarding the implementation of the Statewide Strategic Plan for Science	Organization
Kristen Ames	Canton CSD
Sheila Appel	IBM
Celeste Barker	Schroon Lake CSD
Kelly Baudo	Buffalo Public Schools
Michael Chan	Rochester CSD
Natasha Cooke-Nieves	American Museum of Natural History
Kenneth Huff	Williamsville CSD
Karen Huffman-Kelly	Genesee Community College
Krista Hunter	Syracuse CSD
Diane Irwin	Ballston Spa CSD
Michael Jabot	SUNY Fredonia
Okhee Lee	NYU
Laura Lehtonen	Capital Region BOCES
Jason Lindley	Pelham UFSD
Mary Loesing	Connetquot CSD
Denise McNamara	NYC DOE
Timothy Newton	Union-Endicott CSD
Kate Perry	Robert C. Parker School
Lisa Perry	Yonkers Public Schools
Ann Rivet-Stanley	Columbia University
Doug Schmid	Western Suffolk BOCES
Susan Sciglibaglio	Bethpage UFSD
Kathy Southwell	East Syracuse Minoa CSD
Bruce Tulloch	NYS Science Education Consortium
Mark Vaughn	Corning Incorporated