





THE STATE EDUCATION DEPARTMENT / THE UNIVERSITY OF THE STATE OF NEW YORK / ALBANY, NY 12234

TO: P-12 Education Committee

FROM: Ken Wagner 

SUBJECT: New York's Statewide Strategic Plan for Science and P-12 Science Learning Standards

DATE: January 5, 2015

AUTHORIZATION(S): 

SUMMARY

Issue for Decision

Does the Board approve the final draft of the Statewide Strategic Plan for Science and the process and timeline to develop proposed New York State Science Learning Standards (NYSSLs)?

Background Information

The current New York State Learning Standards for Mathematics, Science, and Technology (MST) were adopted by the Board of Regents in March 1996. In the immediate years following, core curriculum resource guides were developed for elementary-level science (grades K-4), intermediate-level science (grades 5-8), and the commencement-level sciences including chemistry, Earth science, living environment, and physics.

The standards document includes seven standards. Standards 1, 2, 6, and 7 are considered the process standards and are common across the three content areas of mathematics, science, and technology. Standards 3, 4, and 5 are the content standards for mathematics, science, and technology, respectively. Each standard is further specified by several key ideas. Key ideas are further developed by performance indicators that are written for each grade band – elementary, intermediate, and commencement.

Each core curriculum resource guide includes the pertinent standards, key ideas, and performance indicators for each grade band in grades K-4 and grades 5-8 and for each specific discipline – chemistry, Earth science, living environment, and physics – at

the commencement level. The performance indicators included in each core curriculum resource guide are detailed by using major understandings. These learning standards and associated core curriculum resource guides may be accessed online at <http://www.p12.nysed.gov/ciai/mst/sci/ls.html>.

In September 2011, New York State volunteered to serve and was selected by Achieve as a Lead State Partner in the development of the Next Generation Science Standards (NGSS). These standards, finalized in April 2013, and several supporting documents explaining the structure of the NGSS and a number of appendices, are accessible online at <http://www.nextgenscience.org/next-generation-science-standards>.

In March 2014, the Board of Regents discussed quantitative feedback that was collected by a survey used to analyze the merits of the NGSS and the current NYSSLS in a side-by-side comparison. Respondents rated the NGSS statistically higher in 11 out of 21 criteria and rated the current NYSSLS statistically higher in 6 out of 21 criteria. There are four criteria where the differences between the NGSS rating and the NYSSLS rating were not statistically significant. Further analysis of the quantitative data shows that both sets of standards have strengths and weaknesses when compared to the set of criteria used in the survey. Additionally, qualitative feedback collected via the public survey indicated that the current NYSSLS and the NGSS have strengths and weaknesses. Discussions with science education stakeholders reaffirm this feedback.

Statewide Strategic Plan for Science

A draft Statewide Strategic Plan for Science developed by Department staff in collaboration with the Science Content Advisory Panel, the Statewide Leadership Team, and representatives of the NYS Science Education Consortium to guide a comprehensive approach toward improving P-12 science education statewide was presented to the Board in October 2014. As directed by the Board, this draft was posted for public review and feedback.

An online survey was used to solicit feedback from the public. The survey was live from October 29, 2014 until December 8, 2014. Of those who started the survey, 1,650 respondents completed the survey and clicked the submit button.

Of the respondents who provided data:

- Approximately 3/5 (57%) represented the following regions of the state: Long Island (24%), Western New York (19%), and the Capital District (14%).
- The remaining 2/5 of respondents represented the following regions: New York City and the Lower Hudson Valley (9% each), Central New York (8%), and the Mid-Hudson Valley, North Country/Adirondacks, and the Southern Tier (5% each).
- 96% described themselves as an individual, not as a group/organization.

- 82% described themselves as teachers, 5% described themselves as curriculum directors, 2% described themselves as principals, and 2% described themselves as post-secondary educators.

Respondents were asked to review the draft Statewide Strategic Plan for Science, provide both quantitative and qualitative feedback on the various sections of the plan, and asked to provide their levels of support for sections of the strategic plan. Table 1 shows the quantitative feedback received in response to the prompts expressed as a percent of responses for that prompt. As shown in Table 1:

- A majority of respondents indicated either strong or moderate support for all sections of the plan, ranging from a high of 86.6% (Mission and Vision) to a low of 69.0% (Assessment).
- “Strongly” support outpaced “moderately” support in two sections (Professional Development to Enhance Instruction and Materials and Resource Support, 49.2% to 34.4% and 45.0% to 37.0%, respectively).

Table 1

Percentage of Respondents Expressing Level of Support for Each Prompt				
Prompt	Strongly	Moderately	Minimally	Not at All
To what extent do you support the Mission and Vision of the Statewide Strategic Plan for Science?	40.1%	46.5%	10.3%	3.1%
To what extent do you support the goal, objectives, and activities of the Standards critical component included in the Statewide Strategic Plan for Science?	36.8%	47.5%	12.0%	3.7%
To what extent do you support the goal, objectives, and activities of the Curriculum critical component included in the Statewide Strategic Plan for Science?	36.7%	45.1%	14.3%	3.8%
To what extent do you support the goal, objectives, and activities of the Professional Development to Enhance Instruction critical component included in the Statewide Strategic Plan for Science?	49.2%	34.4%	12.4%	4.1%
To what extent do you support the goal, objectives, and activities of the Assessment critical component included in the Statewide Strategic Plan for Science?	25.6%	43.4%	23.9%	7.1%
To what extent do you support the goal, objectives, and activities of the Materials and Resource Support critical component included in the Statewide Strategic Plan for Science?	45.0%	37.0%	13.9%	4.1%
To what extent do you support the goal, objectives, and activities of the Administrative and Community Support critical component included in the Statewide Strategic Plan for Science?	37.9%	41.4%	16.1%	4.6%
To what extent do you support the Board of Regents' adoption of the Statewide Strategic Plan for Science?	35.0%	38.6%	18.3%	8.2%

In addition to the quantitative feedback, respondents were asked to provide comments related to each section of the survey. In total, 3,571 comments were submitted. The Assessment section received the most comments (518) and the Administrative and Community Support section received the least (385).

Many of the comments expressed support for the various sections of the strategic plan. That support, however, is accompanied with concerns related to the:

- implementation of the plan,
- funding required to carry out specific components of the plan, and
- State assessments used to measure student achievement.

Many responses demonstrated support for the plan, but others expressed uncertainty as to the fidelity of implementation of components, based on fiscal constraints at the local level. Funding to support and strengthen quality, sustained professional development in science for all teachers, especially elementary teachers, was a recurring theme. Comments referring to State assessments signaled the importance of the alignment between expected student outcomes and the State assessments used to measure those outcomes.

Although some respondents indicated that the plan was vague and lacked specific details, the purpose of the plan is to provide a broad perspective of the landscape of science education in New York State; a conceptual overview of critical components that must be addressed to ensure an effective and sustained statewide renewal initiative focused on science education. The preamble of the plan includes that it is a “planning and implementation guide.” The general language included in the plan is intentional and allows local school districts, regional professional development providers, and statewide organizations, for example, the flexibility to tailor activities to better meet the specific needs of their stakeholders.

Other comments intimated that respondents believed that the Statewide Strategic Plan for Science was a draft of science learning standards for students. Rather, the plan is intended as a blueprint to guide the planning and implementation necessary to support newly adopted P-12 science learning standards and assist science education stakeholders at the state, regional, and local levels as they implement science learning standards.

There were also some comments that showed a seeming misunderstanding of the phrase “5-year strategic plan.” The comments included references to a 5-year timeline for implementation. To be clear, the 5-year time span included in the plan is solely for the plan itself. The intent is to revisit the plan after a 5-year time period and revise it, as appropriate. There are no specific details related to a timeline for implementation of new science learning standards or associated practices included in the plan. A timeline of this sort will likely be a product of several activities included in the plan.

A limited number of responses suggested amending some text in various sections of the Plan. Department staff discussed these recommendations and concluded the feedback provided related to specific language of any one goal, objective, or activity was limited and did not merit changing the text presented in the draft at this time.

The New York State Science Education Consortium was a major contributor to the draft Statewide Strategic Plan for Science. As the contents of the plan were deliberated, the Consortium developed an advocacy campaign to build awareness of the intent of the plan once it was made public for review and comment. Part of the

advocacy included soliciting letters of support for the plan. Several letters of support have been received by the Department. These letters are included in Appendix C.

Science Learning Standards

In September 2013, the New York State Science Education Consortium, a group consisting of representatives from many of the science education professional associations in New York State, distributed their Position Paper on Next Generation Science Standards to members of the Board of Regents, Department staff, and the general public. This position paper (Appendix D) outlines the Consortium's stance with regard to adopting a new set of science learning standards for New York State.

During their Science Summit XIII held in July 2014, Consortium representatives presented recommendations to Department personnel for consideration as the Department continues to deliberate the future of P-12 science education in New York State. One of their recommendations calls for the development of a New York State version of the NGSS. The Science Content Advisory Panel and Statewide Leadership Team also advocate for the development of a new set of NYSSLS that unify the existing NYSSLS and the NGSS, as appropriate. The quantitative and qualitative feedback collected via the public survey entitled *Comparing Current NYS Science Learning Standards and the Next Generation Science Standards to Certain Criteria* indicated that the current NYSSLS and the NGSS have strengths and weaknesses. Discussions with science education stakeholders reaffirm this feedback.

In accordance with the Statewide Strategic Plan for Science, Department staff would like to convene stakeholders to begin a process focused on developing new New York State Science Learning Standards. The following proposed timeline will guide the process:

- Winter 2015
 - Determine core science content, conceptual understandings, and practices required of all students.
 - Benchmark student expectations.
 - Determine architecture of standards document.
- Spring 2015
 - Write draft standards.
- Summer 2015
 - Post draft standards for stakeholder review and comment.
- Fall 2015
 - Revise standards, based on review and comment.
- Winter 2016
 - Propose science learning standards for Board of Regents' adoption.

Regular updates regarding the process will be provided to the Board of Regents.

Recommendation

Staff recommends that the Board of Regents approve the Statewide Strategic Plan for Science and direct Department staff to move forward to develop proposed New York State science learning standards.

Appendix A: Membership in New York's Statewide Science Leadership and Advisory Groups

<u>Statewide Leadership Team (SLT) - convened by SED; provided feedback to Achieve at various stages of NGSS</u>	<u>Organization</u>
Sheila Appel	IBM
Margaret Ashida	Battelle/STEMx
Kelly Baudo	Buffalo Public Schools
Nicole Bobel	Buffalo Public Schools
Greg Borman	CUNY
Michael Carpenter	SUNY Albany Colleges of Nanoscale Science and Engineering
Jackie Carrese	Capital Area Science Supervisors Association
Michael Chan	Rochester City School District
Natasha Cooke-Nieves	American Museum of Natural History
Linda Curtis-Bey	NYC Department of Education
Joseph Dragone	Ballston Spa Central School District
Kim Drake Hyland	Guilderland Central School District
Don Duggan-Haas	Paleontological Research Institution
Linda Gentiluomo	Schenectady City School District
Kristen Huff	Regents Research Fund
Odalys Igneri	NYC Department of Education
Michael Jabot	SUNY Fredonia
David Kanter	New York Hall of Science
Anu Malipatil	Regents Research Fund
David Marmor	NYC Department of Education
Judy Mayer	Yonkers Public Schools
Denise McNamara	NYC Department of Education
Julie Nucci	Cornell University
William Ottman	Syracuse City School District
Fred Pidgeon	Science Teachers Association of New York State
Charlene Rydgren	Malone Central School District
Thomas Shiland	Saratoga Springs City School District
Jan Stark	Port Jervis City School District
Henry Strada	NYS Technology and Engineering Educators Association
Mark Vaughn	Corning Incorporated
Chuck Ver Straeten	New York State Museum/Geological Survey
Brian Vorwald	Science Teachers Association of New York State
Judy Wegman	Brighton Central School District
Ken White	Brookhaven National Laboratory
Kathy Wronski	Lyndonville Central School District

<u>Science Content Advisory Panel (SCAP) -</u> <i>convened by SED; advises on the revision and implementation of NYS science learning standards</i>	<u>Organization</u>
Lawrence R. Aaronson	Utica College
Marie Anderson	Kingston City School District
Jennifer Baxter	Palmyra-Macedon Central School District
Fernando Espinoza	SUNY Old Westbury
Karen Harris	Schodack City School District
Karen Huffman-Kelly	Genessee Community College
David Kanter	New York Hall of Science
Denise McNamara	NYC Department of Education
William Panaram	NYC Department of Education
Kate Perry	Robert C. Parker School
Shane Price	Lyndonville Central School District
Ann Rivet	Columbia University
Susan Sciglibaglio	Bethpage Union Free School District
Mark Vaughn	Corning Incorporated
Linda Weinberg	SUNY Delhi

<u>NYS Science Education Consortium -</u> <i>convened by consortium; combination of leaders from the 16 regional sections of STANYS and teacher professional organizations across the state</i>	<u>Organization</u>
John Augenstein	Science Council of New York City
Jackie Carrese	Capital Area Science Supervisors Association
John Cunninham	Science Council of New York City
Connie Duff	New York State Science Education Leadership Association
Steve Fielman	Science Teachers Association of New York State
Fran Hess	Science Teachers Association of New York State
Kathy Hoppe	Science Teachers Association of New York State
Mary Loesing	Long Island Science Education Leadership Association
Linda Padwa	Biology-Chemistry Professional Development Network
Fred Pidgeon	Science Teachers Association of New York State
Patricia Price	Higher Education Representative
Arnie Serotsky	Science Teachers Association of New York State, Co-Facilitator
Mary Thomas	Science Teachers Association of New York State
Bruce Tulloch	Facilitator
Brian Vorwald	Science Teachers Association of New York State

Appendix B: Statewide Strategic Plan for Science

Preamble

The Statewide Strategic Plan for Science serves as a planning and implementation guide to support newly adopted P-12 science learning standards. The strategic plan begins with mission and vision statements. The mission statement describes the desired result, and provides a reason for the plan's existence. The vision statement describes how the mission will be achieved. Six critical components – Standards, Curriculum, Professional Development to Enhance Instruction, Assessment, Materials and Resource Support, and Administrative and Community Support – each enhanced by a single goal, focus the vision. Each goal is supported by a number of objectives, which are achieved by successfully completing a number of discrete activities.

Considered in a broad sense, the six critical components are each equally important. One carries no more importance than another, and all six must be considered simultaneously at all stages of implementation. During specific stages of implementation, however, one or more of the six critical components may be deserving of more attention than the others, but the others must still be considered. Achieving the goal of each critical component is dependent upon achieving the goals of the other critical components. Achieving the mission is dependent upon achieving each of the goals of each of the six critical components.

The mission of the Statewide Strategic Plan for Science can only be realized if all of the stakeholders are involved in its implementation. Creating a Statewide learning community involves all stakeholders including, but not limited to, students, parents, other caregivers, teachers, counselors, other supporting educators/mentors, informal educators, administrators, college professors, members of professional associations, institutes, and/or societies, business and industry professionals, and government officials. Each community member is invited and expected to participate in achieving the mission. Collaboration and participation of all community members, as their expertise shall warrant, will provide the most effective avenue to achieving the mission.

In the plan, the term STEM refers to both the individual disciplines associated with science, technology, engineering, and mathematics and the connections between these disciplines.

Statewide Strategic Plan for Science

Mission

Create a Statewide learning community to enhance science education and improve student achievement of the New York State science learning standards leading to career and college readiness and a scientifically literate population capable of addressing the needs of society, participating in a global economy, and sustaining the physical and living environment.

Vision

Ensure the teaching and learning of science for all P-12 students by providing equitable access to exemplary teachers, science curriculum programming, instructional practices, and standards-based assessments that are reflective of research and best practices, along with quality resources and support from stakeholders at large.

Standards

Goal: Adopt new P-12 NYS science learning standards and 5-year strategic plan.

Objective: Direct the review, revision, and adoption process for identifying new P-12 NYS science learning standards.

Activities:

- Develop a 5-year, statewide strategic plan for science for adoption by the Board of Regents.
- Develop and post a public survey to gather stakeholder feedback on comparing current NYS science learning standards and nationally developed Next Generation Science Standards (NGSS) to research-based standards evaluation criteria.
- Engage science education stakeholders to analyze feedback from the public survey.

Objective: Determine the core science content, conceptual understandings, and practices for all students P-12 that develops scientifically literate citizens who are better prepared to pursue college and/or career pathways.

Activities:

- Convene committees of stakeholders to review feedback from the public survey, other pertinent data, and current research in science and science education, as well as other international, national, and state standards documents.
- Develop a recommendation to the Board of Regents regarding the adoption of a revised set of the current NYS science learning standards, the adoption of a new set of P-12 NYS science learning standards incorporating the tenets of the Framework for K-12 Science Education, the adoption of a new set of P-12 NYS science

learning standards influenced by the NGSS, or the adoption of the NGSS.

- Develop cross-content area benchmarks for use both within and across P-12 grade levels to support horizontal and vertical articulation between the science disciplines and other content areas.
- Identify convergences with engineering, technology, the New York State P-12 Common Core Learning Standards for Mathematics, and the New York State P-12 Common Core Learning Standards for English Language Arts and Literacy.

Objective: Implement and sustain the 5-year strategic plan for transitioning to the new P-12 NYS science learning standards.

Activities:

- Develop a reasonable timeline for the adoption of and transition to implementation of the new P-12 NYS science learning standards.
- Secure funding to support and sustain the implementation process at the State, regional, and local levels.
- Ensure that the six critical components – Standards, Curriculum, Professional Development to Enhance Instruction, Assessment, Materials and Resource Support, and Administrative and Community Support – of the 5-year strategic plan are addressed concurrently during the implementation process.

Curriculum

Goal: Provide opportunities that are reflective of research and best practices for P-12 students to engage with scientific phenomena through implementation of innovative science curriculum programming that fosters learning, deep understanding, and application of core science content, conceptual understandings, and practices.

Objective: Survey current research pertaining to teaching and learning in science, science education, and cognitive science to develop relevant curriculum guidance and resources.

Activities:

- Explore, identify, and provide access to pertinent research.
- Develop articulated P-12 guidance to support curriculum development and implementation aligned to the new P-12 NYS science learning standards.
- Provide funding opportunities for equitable development and/or adoption of exemplary science curriculum programming.
- Provide funding opportunities for equitable implementation and evaluation of exemplary science curriculum programming at the regional and local levels.
- Align and incorporate relevant connections to engineering, technology, the New York State P-12 Common Core Learning Standards for Mathematics, and the New York State P-12 Common Core Learning Standards for English Language Arts and Literacy.
- Review and update curriculum guidance and resources to be reflective of changes in instructional technology, content, and best educational practices, emphasizing active engagement in STEM.

Objective: Build the capacity of regional centers and local school districts to implement curriculum and instructional programs that are based on the new P-12 NYS science learning standards.

Activities:

- Support the implementation of exemplary, data-informed science curriculum programming and instructional materials, using cross-curricular connections from engineering, technology, the New York State P-12 Common Core Learning Standards for Mathematics, and the New York State P-12 Common Core Learning Standards for English Language Arts and Literacy that strengthen, support, and reinforce the development of scientific literacy.
- Leverage funding opportunities for partnerships and collaborations of science education stakeholders for the development, dissemination, and implementation of local and regional curriculum programming.
- Engage education stakeholders with expertise in various disciplines to support local and regional development, dissemination, and

implementation of curriculum based on the new P-12 NYS science learning standards.

- Create opportunities that bring students into contact with working scientists, mathematicians, and engineers through innovative curriculum design, internships, and mentorships with institutes of higher education and/or business and industry partners.

Objective: Incorporate the use of technology to expand the development, dissemination, and implementation of curriculum and instructional resources to broaden accessibility.

Activities:

- Leverage existing and seek new funding sources to support the use of technology to develop, disseminate, and implement science curriculum and instructional resources through various delivery platforms.
- Utilize multiple platforms to access exemplary curriculum and instructional resources.
- Build student resources by establishing community-based programs that provide relevant STEM applications in science curriculum and instructional programs.

Professional Development to Enhance Instruction

Goal: Initiate, build, and sustain collaborations and partnerships to provide specific and focused professional development to support the teaching and learning of core science content, conceptual understandings, and practices P-12.

Objective: Provide opportunities for local educational agencies to collaborate and partner with STEM education stakeholders to develop and implement effective professional development models that are based upon the new P-12 NYS science learning standards.

Activities:

- Establish networks of stakeholders in STEM education to provide professional development that enhances the development, dissemination, and implementation of curriculum, instructional and assessment materials, and other resources.
- Engage local, state, and national professional and science education associations to lead and sustain STEM-related professional development opportunities for face-to-face and online collaboration.
- Build the capacity of interested business and industry experts to effectively partner with local educational agencies by promoting pertinent professional learning opportunities and resources.
- Target funding opportunities that support partnerships between business and industry, institutes of higher education, professional and science education associations, local education agencies, and

other stakeholders to sustain professional development for teachers and leaders in science.

- Promote institutes, courses, and/or workshops that enhance the teaching and learning of the individual disciplines associated with science, technology, engineering, and mathematics and the connections between these disciplines.
- Create access to new and/or existing, online, on-demand venues for specific and focused professional development.

Objective: Increase teacher and leader participation and engagement in professional development opportunities that are based upon the new P-12 NYS science learning standards to build subject knowledge and pedagogical-content knowledge in the sciences by leveraging the expertise of science education stakeholders.

Activities:

- Design opportunities to coordinate professional development that articulates collaborations and partnerships across P-16.
- Target annual professional development in science that builds specific subject knowledge and pedagogical-content knowledge toward fulfilling the 175 hours required for maintenance of certification.
- Provide funding opportunities for teachers and leaders to participate in sustained, online or on-site professional development institutes, professional learning communities, courses, and/or workshops during the school year.
- Incorporate career-ladder incentives for teachers and leaders to provide professional development sessions and engage in professional development opportunities that are related to STEM education.
- Identify or develop and implement a needs assessment to determine the focus of future professional development opportunities.
- Create professional development opportunities that bring teachers and leaders into contact with working scientists, mathematicians, and engineers through internships and mentorships with peer teachers, institutes of higher education, and/or business and industry partners.

Objective: Include components of science and engineering practices for pre-service STEM teacher and leader preparation programs and in continuing professional development opportunities that are based upon the new P-12 NYS science learning standards for in-service teachers and leaders.

Activities:

- Build teacher resources by establishing community-based programs that provide relevant STEM applications in science curriculum and instructional programs.

- Create or access professional development opportunities that focus on the integration of science and engineering practices in STEM courses.
- Articulate collaborations and partnerships between STEM stakeholders that support curriculum programming and instructional practices that are better aligned to college and career expectations.
- Establish partnership programs between local education agencies and institutes of higher education to foster innovative comprehensive approaches that enhance pre-service and in-service teaching and learning of science and engineering practices.

Assessment

Goal: Support the development of assessments at the state, regional, and local levels that measure student achievement of all new P-12 NYS science learning standards, and use the data resulting from these assessments to enhance teaching and learning.

Objective: Explore established and contemporary science assessment models at the international, national, state, regional, and local levels to implement changes in the P-12 science assessment system that are reflective of the new NYS P-12 science learning standards.

Activities:

- Convene science education stakeholders to review and evaluate New York State's current assessment system for the sciences P-12.
- Collaborate between states to discuss and/or develop science assessments that have common blueprints.
- Propose a P-12 science assessment system that reflects the core science content, conceptual understandings, and practices that are included in the new P-12 NYS science learning standards.
- Develop and recommend an implementation timeline that is based on the Board of Regents' decision regarding the new P-12 NYS science learning standards and assessment system.

Objective: Understand and use relevant student achievement data from State science assessments to initiate data-driven professional development, curriculum, instruction, and assessment.

Activities:

- Collaborate with science education stakeholders statewide, regionally, and locally to provide professional development for teachers and leaders that is focused on understanding and analyzing student achievement data for improving science teaching and learning.
- Provide professional development opportunities for teachers and leaders to better understand the intent and design of an assessment

system that is aligned to the new P-12 NYS science learning standards.

- Provide professional development on the use of student achievement data to foster the development of formative assessments at the local and regional levels.
- Continue to develop and administer valid and reliable State science assessments to drive professional development to improve teaching and student achievement.

Materials and Resource Support

Goal: Support regular and substantive teaching and learning of core science content, conceptual understandings, and practices through scientific inquiry and authentic engagement with natural phenomena by providing models of effective systems management and dissemination of science materials.

Objective: Create new and identify existing science material centers (regional, district, school-based) and related resources to support the equitable access and implementation of exemplary, cost-effective curriculum programming and instructional materials that are aligned to the new P-12 NYS science learning standards.

Activities:

- Seek funding opportunities to acquire equipment, materials, and supplies to support the development, implementation, and sustainability of P-12 science curriculum and instructional programming at the local and regional levels.
- Identify new or use existing funding streams to support facilities planning to provide physical space that is conducive to teaching and learning in state-of-the-art classrooms and laboratories.
- Develop collaborations and partnerships to promote and support comprehensive systems for the development, implementation, and sustainability of science materials and resources.
- Seek funding opportunities for instructional technologies that support core science and engineering content, conceptual understandings, and practices.

Objective: Build the capacity of local educational agencies, higher education institutions, business and industry partners, and other profit and nonprofit organizations to connect teachers and students to relevant, real-world science applications that are aligned to the new P-12 NYS science learning standards.

Activities:

- Develop partnerships between STEM stakeholders and school districts that collaborate to provide education outreach for science materials and other logistical support.

- Provide mentorships and research opportunities for teachers and students through incentives to build partnerships between business and industry, higher education institutions, and/or other STEM stakeholders (i.e., museums, nature centers, community organizations, etc.).
- Provide incentives for outreach opportunities and technical support for laboratory experiences and rentals of high-tech research equipment.
- Capitalize on the regional and local capacity to offer distance learning and online courses through partnerships and grants.
- Investigate opportunities to expand access to science content through online resources.

Administrative and Community Support

Goal: Build the capacity to enhance science education and ensure career readiness by involving STEM stakeholder partnerships and alliances between school districts, institutions of higher education, science education professional organizations, business and industry, informal education organizations, government agencies, and the larger learning communities: local, regional, state, national, and international arenas.

Objective: Identify science education stakeholders to lead the development and continued growth of partnerships focused on comprehensive revitalization of science education.

Activities:

- Support collaborations with regional STEM hubs that provide access to various higher education faculty and business and industry experts and their facilities to raise awareness of real-world applications and opportunities in STEM college and career pathways.
- Engage key STEM stakeholders to serve as catalysts in the advancement and implementation process pertaining to NYS science education to build and sustain a STEM talent pipeline.
- Utilize informal (i.e., museums, nature centers, community organizations, etc.) and formal (i.e., P-12 schools, institutes of higher education, business and industry, research centers) STEM education stakeholders and their resources to promote and support new and existing innovative science education initiatives (i.e., fellowships, internships, mentorships, research opportunities).
- Identify models of effective collaborations between departments of science, technology, engineering, and mathematics and teacher education programs of institutes of higher education.
- Provide incentives for institutes of higher education to facilitate collaborations between departments of science, technology,

engineering, and mathematics and teacher education programs of institutes of higher education.

- Develop and implement career ladder incentives for teachers and administrators that build the leadership capacity and talent pool of STEM departments of school districts and in institutes of higher education.

Objective: Review, revise, and propose regulations that reflect engagement in innovative teaching and learning through authentic experiences with natural phenomena that lead to the achievement of the new P-12 NYS science learning standards by all students.

Activities:

- Solicit input from STEM education stakeholders, ensuring the involvement of experts from P-12 education, institutes of higher education, and business and industry in the advisement and recommendations for regulations addressing qualifications to teach science P-12.
- Convene science education stakeholders to re-examine the alignment of teacher certification P-12 to the structure of the new P-12 NYS science learning standards, the Framework for K-12 Science Education, and the NGSS.
- Re-examine pre-service program requirements to include multiple paths to acquire endorsements of specialization in science education P-12.
- Re-examine the current in-service professional development requirement (175 hours over 5 years) to recommend a minimum allocation of time toward teacher participation in science pedagogical content knowledge-based PD and the distribution of these hours over time.
- Review commissioner's regulations pertaining to science program and diploma requirements P-12 and consider amendments to reflect the knowledge and skills as consumers of scientific and technological information related to their everyday lives and enabling them to enter the colleges and/or careers of their choice.
- Ensure internal collaboration and consultation between various program offices within the NYSED to propose the requisite changes in regulations.

Objective: Leverage fiscal and human resources, through STEM education stakeholder partnerships to catalyze and sustain the revitalization of science education statewide, regionally, and locally.

Activities:

- Explore funding opportunities offered by both public and private sectors to establish STEM stakeholder partnerships that are focused on enhancing programs in STEM education by embracing models

that are similar to those used in the National Board Certification process.

- Re-evaluate the coordination, allocation, and distribution of state and federal funding streams to better support science education.
- Identify available grants to sustain the implementation of the new P-12 NYS science learning standards through partnerships within the State's established infrastructure, such as BOCES, museums, STEM Hubs, etc.

Objective: Enhance public relations to heighten the importance and strengthen the presence of P-12 science education in New York State.

Activities:

- Develop a statewide plan for improving communication with science stakeholders and the community at large about the benefits of STEM education.
- Develop a plan to build awareness regarding the importance of science education for citizenry and readiness for college and/or careers.
- Build support and enhance knowledge of the public and private sectors to promote effective implementation of science curriculum programming, instructional practices, and standards-based assessments that are aligned to the new P-12 NYS science learning standards.

Appendix C: Letters of Support for the Statewide Strategic Plan for Science
(as of December 29, 2014)

Position Paper on Next Generation Science Standards
New York State Science Education Consortium
September, 2013

The New York State Science Education Consortium has reviewed and discussed the Next Generation Science Standards (NGSS). The Consortium recognizes the need for change in science education and views the NGSS as a promising vehicle for implementing that change. However, at the outset, the Consortium's position is that any significant reform in science education must be accompanied by review and revision to existing policies and regulations governing K-12 science education in New York State so that the reform can be enhanced rather than compromised. Assuming this policy and regulatory review and revision will be completed, the Consortium *conditionally* recommends adoption and implementation of the NGSS by the New York State Board of Regents and New York State Education Department with the following caveats:

- A New York State version of the NGSS must be wisely implemented with full funding to support the design and development of new state curriculum guidance documents and assessments and the provision of a robust professional development initiative.
- While the amount of disciplinary content in the NGSS is generally appropriate to meet *minimum* science literacy expectations for *all students*, there are some fundamental concepts and principles missing. For example, there are concepts and principles in the current state core curricula in Intermediate Level Science, Regents Earth Science, and Regents Living Environment that are not found in the NGSS but are important to learn if students are to become college and career ready. So, to a developmentally appropriate degree, these concepts and principles must be added to a New York State version of the NGSS and the derivative state curriculum guidance documents and assessments.
- The goals and performance expectations of the NGSS are necessary for all students but not sufficient for preparing students who intend to pursue professional careers in science, engineering, and/or technology. Therefore, the adoption and implementation of a New York State version of the NGSS must leave room for the development

and existence of upper level high school science courses that serve the pre-professional needs of this important population of students. These upper level courses include Regents Chemistry, Regents Physics, Advanced Placement science courses, International Baccalaureate science courses, and college-level science courses. These courses will include content that moves students towards achieving the NGSS but also include content at more advanced levels than NGSS.

- The adoption and implementation of a New York State version of the NGSS represents a paradigm shift in K-12 science education in our state and can only be successful if the following steps are taken:
 - Planning for implementation must include the significant and sustained involvement of New York State science teachers, science supervisors, teacher educators and the science educator professional associations.
 - New York State teachers of science and other science educators must be instrumentally involved in the development of the state's curriculum guidance documents, assessments, professional development initiatives, and other factors directly related to the implementation of a New York State version of the NGSS. While the state should take advantage of the regional and national work associated with the adoption of NGSS in other states, the expertise, contextual insights, and experience of its own science educators must be drawn upon to ensure a successful adoption.
 - If a New York State version of the NGSS is adopted by the Board of Regents, the timeline for K-12 implementation should give sufficient time for the field to become aware of the new standards, develop local and regional curricula aligned with new state curriculum guidance documents, and align instructional programs and local assessments with the new state science assessments.
 - Implementation of a New York State version of the NGSS will require a statewide, systemic, focused, and sustained professional development initiative to provide K-12 teachers of science with the knowledge and skills necessary to teach the New York State version of the NGSS effectively. Consortia of school districts and schools such as BOCES, the Big Five Cities, professional science

educator associations, institutions of higher education, business, and other stakeholders must be involved in the planning and monitoring of this initiative.

A thorough and successful implementation of a New York State version of the NGSS will require an ambitious and sustained initiative and the resources to support this initiative. If the Board of Regents is committed to implementing the recommendations of this position paper and aggressively seeking funding to support the initiative, then the New York State Science Education Consortium fully supports the adoption of a New York State version of the Next Generation Science Standards.

John Augenstein
Founding President
Science Council of New York City

Donna Banek
Secretary
Science Teachers Association of New York State

Joyce Barry
Past President
Long Island Science Education Leadership Association

Lisa Brosnick
Director At Large for Biology
Science Teachers Association of New York State

Jackie Carrese
President
Capital Area Science Supervisors Association

John Cunningham
President
Science Council of New York City

Theresa Curry
President
Long Island Science Education Leadership Association

Paul Fedoroff
Director At Large for Physics
Science Teachers Association of New York State

Steven Fielman
Director At Large for Intermediate Science
Science Teachers Association of New York State

Gene Gordon
Vice President
Science Teachers Association of New York State

Frances Hess
President
Science Teachers Association of New York State

Jason Horowitz
President-Elect
Science Teachers Association of New York State

Kenneth Huff
Director At Large for Professional Development
Science Teachers Association of New York State

Elaine Jetty
Coordinating Mentor
Biology-Chemistry Professional Development Network

Jean Lorch
Vice President
Capital Area Science Supervisors Association

Linda Padwa
Director
Biology-Chemistry Professional Development Network

Fred Pidgeon
Co-Facilitator of Summit XII
Science Teachers Association of New York State

Patricia Price
Higher Education Representative
New York State Science Education Consortium

Rebecca Remis
Director At Large for Earth Science
Science Teachers Association of New York State

William Roome
Director At Large for Chemistry
Science Teachers Association of New York State

Maria Russo
Eastern Section Subject Area Representative for Chemistry
Science Teachers Association of New York State

Douglas Schmid
Representative
BOCES Science Coordinators Network

Arnie Serotsky
Co-Facilitator of Summit XII
Director of Communications
Science Teachers Association of New York State

Mary Thomas
Director At Large for Elementary Science
Science Teachers Association of New York State
New York State Science Education Leadership Association

Bruce Tulloch
Facilitator
New York State Science Education Consortium

Brian Vorwald
Immediate Past President
Science Teachers Association of New York State

Appendix C: Letters of Support for the Statewide Strategic Plan for Science
(as of December 29, 2014)

CASSA

November 20, 2014

Shenendehowa CSD
Jean Lorch, President
Bethlehem CSD
Jennifer Gonyea, Vice-
President

Ballston Spa CSD
Diane Irwin
Berlin CSD
Audrey Vanderhoef
Burnt Hills-Ballston
Lake CSD
William McQuay
Cairo-Durham
Susan Boyle
Capital Region BOCES
Laura Lehtonen
Guilderland CSD
Mike Piscitelli
Beverly Bisnett
Hadley-Luzerne CSD
Steve Danna
Mohonasen CSD
Makensie Bullinger
Niskayuna CSD
Jackie Carrese, Past
President
North Colonie CSD
Keith Bogert
Ravena Coeymans CSD
Stephanie Branley
College of St. Rose
Pat Price
Saratoga CSD
Joseph Greco
Schenectady CSD
Danielle Bouton-Wales
Scotia-Glenville CSD
Randy Jenkins
Shenendehowa CSD
Rose Barra
South Colonie CSD
Gregory Bearup
Troy CSD
Seth Cohen
Union Graduate College
Bruce Tulloch

Dr. Meryll H. Tisch
Chancellor, New York State Board of Regents
New York State Education Department
89 Washington Avenue
Albany, New York 12234

Dear Chancellor Tisch,

We understand that the Board of Regents received a Statewide Strategic Plan for Science at its October 2014 meeting and will consider adoption of the Plan in January 2015.

As one of the stakeholder organizations seeking the highest quality science education for all of our P-12 students, we strongly recommend that the Board of Regents adopt the Statewide Strategic Plan for Science and begin the development of new state science learning standards early next year.

There are several reasons underlying our recommendation. First, our current NYS science standards were adopted in 1996 and the world of science and what we know about teaching and learning science has changed. The NYS science standards should reflect our current understandings about the natural world and incorporate best instructional approaches to use in science classrooms at all levels.

Second, while current state science learning standards focus on scientific inquiry and communication, common themes, and interdisciplinary problem solving in addition to science concepts and principles, state curriculum guidance documents and assessments have given uneven emphasis to these standards. This has often resulted in teaching that fails to integrate scientific knowledge with the practices and reasoning that use and produce this knowledge. The process of developing new science standards will enable the State to draw upon contemporary resources, including the Next Generation Science Standards where science and engineering practices, disciplinary knowledge, and cross-cutting concepts have been fully integrated into the expectations for student performance. The process will also enable the new science standards to be aligned with curriculum in Technology, Mathematics, and English Language Arts.

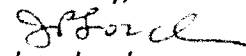
Third, the Strategic Plan provides a reasonable and comprehensive five-year timetable for renewal of our standards involving a diverse body of stakeholders who can contribute to the various components; including standards development, curriculum development, professional development, assessment, materials support, and administrative and community support. Since the Plan was developed by the

state in collaboration with practicing science educators and with other stakeholder professional organizations, there is already widespread support from the science education community. This support will help ensure that the Plan is successfully implemented.

Finally, there is much discussion about the need for our state and nation to be globally competitive and for more of our young people to pursue STEM-related careers. These needs cannot be addressed with so many of our students graduating from high school without a strong background in physical science or with experiences in science that fail to inspire and encourage them to pursue the subject in college and in their careers. If we wish to prepare the next generation of scientists and engineers and to enhance the scientific literacy of all of our students, we believe that now is the time for action. The Strategic Plan provides a viable and research-based roadmap to accomplish these goals.

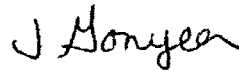
We trust that the Board of Regents will provide the necessary leadership to move New York State science education forward by approving New York's Statewide Strategic Plan for Science as soon as possible.

Sincerely,



Jean Lorch

President



Jennifer Gonyea

Vice President

cc: Commissioner John King
Deputy Commissioner Ken Wagner
Vice Chancellor Anthony Bottar
Chancellor Emeritus Robert Bennett
Regent Charles Bendit
Regent Andrew Brown
Regent Kathleen Cashin
Regent Christine Cea
Regent James Cottrell
Regent James Dawson
Regent Josephine Finn
Regent Wade Norwood
Regent Harry Phillips
Regent Betty Rosa
Regent James Tallon
Regent Roger Tilles
Regent Lester Young

Science Teachers Association of New York State, Inc.
www.stanys.org



November 29, 2014

Dear Deputy Commissioner Wagner,

This letter affirms the support of the Directors at Large (DALs) of the Science Teachers Association of New York State for the Statewide Strategic Plan for Science. We believe the strategic plan is a key element toward successfully preparing students for college, careers, and citizenship.

Sonja Anderson
DAL
Environmental
Science

Lisa Brosnick
DAL Biology

Loretto Canfield
DAL Intermediate

Paul Fedoroff
DAL Physics

Kenneth Huff
DAL Professional
Development

Thomas O'Brien
DAL Colleges

Polly Peterson
DAL Sections

Barbara Poseluzny
DAL Retirees

Rebecca Remis
DAL Earth Science

William Roome
DAL Chemistry

Mary Thomas
DAL Elementary

In a large-scale public opinion research survey about education, science, and standards conducted by Achieve Inc. in the spring of 2012, voters' opinions were clear: 97% believe that improving the quality of science education is important to the United States' ability to compete globally. The United States is facing unprecedented competition today, and ensuring our position as a leading economy depends on the ability to provide our students with a robust science education. The U.S. will be able to compete in the global economy only if our students obtain a solid science education that is based on research.

Raising learning expectations for students in K-12 science will properly prepare them for postsecondary and career success. The adoption of the Statewide Strategic Plan for Science is a necessary first step toward the development of new standards for science learning. Our current science standards have not been updated in 18 years. We need a set of standards that take into account the explosion of technology since 1996 and the current literature in science and education. The process of developing new science standards will enable the State to draw upon the latest research from the National Research Council and how students engage and learn most effectively. The Next Generation Science Standards (NGSS) which are based on this research, provide the foundation for what ALL students should know about science. The NGSS seek to educate the whole student; their focus on systems thinking, and developing critical and contextual thinking skills will ensure college and career readiness for the 21st century. The NGSS were benchmarked against countries whose students perform well on the Programme for International Student Assessment and the Trends in International Math and Science Study.

The Statewide Strategic Plan for Science represents a vision and a plan to move science education forward in New York State. The DALs of the Science Teachers Association of New York State ask that the Board of Regents favorably consider adopting the strategic plan paving the way for research based science standards.

Sincerely,

Directors at Large, Science Teachers Association of New York State

"Providing opportunities for all students to participate in and learn science."

Biology-Chemistry Professional Development Network
Stony Brook University
Stony Brook, NY 11794-5233

December 1, 2014

Dr. John B. King, Jr.
Commissioner, New York State Education Department
State Education Building
89 Washington Avenue
Albany, NY 11234

Dear Dr. King:

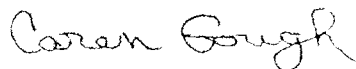
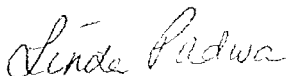
This letter is written in support of the Statewide Strategic Plan for Science that was recently received by the Board of Regents. The Strategic Plan was developed with input from a wide-range of stakeholders within the Science Education community in New York State. It represents the collected view that there is need for revision of the current Core Curriculum documents based on New York Science Learning Standards that were developed in 1996. While these were excellent standards for their time, revision is needed to meet the needs of a new generation.

Research has led to changes in our view of how science should be taught and these new understandings are reflected in the recently published Next Generation Science Standards (NGSS). A shift in emphasis towards process rather than recall of facts promises to increase students' readiness for college and career upon graduation from high school. The progressions described in the NGSS can serve as a guide for revision of the New York State Science Standards and development of revised Core Curricula for Science in grades K-12.

The Biology-Chemistry Professional Development Network assisted with the introduction of the current Core Curricula and fully supports the plan for changes to science instruction in the state as outlined in the Statewide Strategic Plan for Science. This plan addresses the needs of students, teachers, administrators, as well as the community as a whole. It would be our honor to be part of the effort to roll out a New York State version of revised Science Standards based on principles delineated in the NGSS, which includes an emphasis on crosscutting concepts and integration of scientific and engineering practices through all aspects of science instruction.

If we can be of any assistance as you consider the implementation of the Strategic Plan for Science that is now before the Board of Regents, please contact us directly.

Sincerely yours,



Linda Padwa
Linda.Padwa@stonybrook.edu
Co-Directors, Biology-Chemistry Professional Development Network

Caren Gough
Caren.Gough@stonybrook.edu

New York State Science Education
Leadership Association

J. Zawicki, President
53 Norman Place
Amherst, NY 14226

December 1, 2014

Deputy Commissioner Ken Wagner
NYS Education Department, 89 Washington Avenue
Albany, NY 12236

Dear Deputy Commissioner Wagner,

Thank you for taking the time to collect input from the field regarding the New York State Strategic Plan for Science. The New York State Science Education Leadership Association (NYSSELA) is an organization of science education leaders from across New York State. Our executive committee has polled our membership and discussed the issue among our leadership, and we would like to take this opportunity to provide you with our insights.

NYSSELA has routinely been involved with the New York State Science Education Summits and with the preparation of the statewide Strategic Plan for Science. Our leadership strongly supports the mission and vision of the Statewide Strategic Plan for Science; we wholeheartedly support the Board of Regents' adoption of the document. As a whole, our leadership strongly supports the goals, objectives and activities of the six critical components of the Statewide Strategic Plan for science – including those related to standards, curriculum, professional development, assessment, materials and resource support and administrative and community support.

Our membership, either strongly or moderately, supports the components of the Statewide Strategic Plan for Science. There is a small but strongly vocal minority that have expressed concern about either the watering down of our current New York State Science Standards, or, alternatively, wish to see a stronger commitment to the Next Generation Science Standards (NGSS) and their inherent incorporation of science, mathematics, engineering and technology (STEM) standards. The move to the NGSS clearly calls for a paradigm shift that will take a considerable period of time to implement; our leadership is confident that the suggested year of study, prior to any possible adoption or adaptation, will be sufficient to ensure that both of these concerns are adequately addressed. While these results should not be construed to represent all of our members, they do reflect the rankings, comments and attitudes of those members who opted to respond to our call for action.

Thank you for your support for science education and for our students throughout New York State. Please do let me know if I may be of any further assistance.

Respectfully,

Joseph L. Zawicki, Ph.D.
President, NYSSELA
Joe

--

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--

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Dr. John B. King, Jr.
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New York State Education Department
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12/1/14

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*A chapter of the National
Science Teachers Association
(NSTA)*

*A member of the New York
State Council of Education
Associations (NYSCEA)*

Dear Commissioner King:


On behalf of the Executive Committee of the Science Teachers Association of New York State (STANYS), I would like to voice our support for the Statewide Strategic Plan for Science. The process it proposes establishes a sound plan to revise the New York State Science Learning Standards. Adoption of the Plan by the Board of Regents will enable the State to begin the development of updated science standards that can incorporate contemporary resources including the Next Generation Science Standards with our existing ones.

STANYS, as the oldest and largest professional science educator association in NYS, has been an active participant in the NYS Science Education Consortium which is among the Statewide Science Leadership and Advisory Groups. In 2013, STANYS provided support for an expanded Summer Summit to review and propose a position paper on the Next Generation Science Standards. This summer we provided recommendations to NYSED personnel as the Department was deliberating on the future of P-12 science education in NYS. The STANYS organization will continue to assist in the State with the important endeavor of moving science education forward.

We are pleased science standards are now on the Regents' agenda. Our current New York State Learning Standards for Mathematics, Science, and Technology (MST) were adopted by the Board of Regents in March 1996. Since then much has happened in regard to student learning and teaching, in addition to changes that have occurred within the content itself. Our State science standards should reflect the current state of understanding about the natural world and how best to teach what we know to children and young people. Members of the STANYS leadership believe it is time for NYS to invest in updating our State's science standards.

STANYS stands ready to help in this endeavor and we hope that you will call on us as the Statewide Strategic Plan for Science is implemented during the next year.

Sincerely,


Jason A. Horowitz
President, STANYS

STANYS 119th Conference, November 1-4, 2014
Rochester, NY

WNY STEM

wnystem.org

December 3, 2014

Dear Deputy Commissioner Wagner:

Thank you for taking the time to collect input from the field regarding the New York State Strategic Plan for Science. The Western New York STEM Hub (WNY STEM) is an incorporated non-profit organization of STEM leaders from Allegany, Cattaraugus, Chautauqua, Erie and Niagara Counties. Our board of directors has polled our membership and discussed the document at some length. We would like to take this opportunity to provide you with our insights.

Our leadership strongly supports the mission and vision of the Statewide Strategic Plan for Science. We wholeheartedly support the Board of Regents' adoption of the document. As a whole, our leadership strongly supports the goals, objectives and activities of the six critical components of the Statewide Strategic Plan for science – including those related to standards, curriculum, professional development, assessment, materials and resource support and administrative and community support.

Our membership, either strongly or moderately, supports the components of the Statewide Strategic Plan for Science. There is a contingent that has expressed concern about preferring to see a stronger commitment to the Next Generation Science Standards and their inherent incorporation of science, mathematics, engineering and technology (STEM) standards. The NGSS clearly call for a paradigm shift that will take a considerable period of time to implement. Our leadership is confident that the suggested year of study, prior to any possible adoption or adaptation, will be sufficient to ensure that both of these concerns are adequately addressed.

Thank you for your support for science education and for our students throughout New York State. Please do let me know if I may be of any further assistance.

Respectfully,



Michelle Kavanaugh, Ed.D.
Facilitator for the WNY STEM Hub



Science Teachers Association of New York State, Inc.

Suffolk Section

P.O. Box 5101, Hauppauge, New York 11788
<http://www.suffolkstanys.org/>

December 3, 2014

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Gblink735@gmail.com

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Dr. Merryl H. Tisch
Chancellor
New York State Board of Regents
State Education Building
89 Washington Avenue
Albany, NY 12234

Dear Dr. Tisch,

On behalf of the members of the Science Teachers Association of New York State (STANYS) Suffolk Section, I would like to express our support for the Statewide Strategic Plan for Science. As one of the stakeholders seeking the highest quality science education for all of our P-12 students, we strongly recommend that the Board of Regents adopt the Statewide Strategic Plan for Science and begin the development of new State science learning standards early next year.

We believe it is time for NYS to invest in updating our State's science standards. Our current State science learning standards were adopted in 1996 and the world of science and what we know about teaching and learning science has changed. Our standards should reflect more on the skills of a practicing scientist and incorporate the growing role of technology. Our State science standards should reflect the current state of understanding about the natural world and how best to teach what we know to children and young people.

Adoption of the Statewide Strategic Plan for Science will begin the process of developing new science standards. This will enable the State to integrate contemporary resources like the Next Generation Science Standards with our existing standards. We should develop standards in which science and engineering practices, disciplinary knowledge, and cross-cutting concepts have been fully integrated into the expectations for student performance. The process will also enable the new science standards to be tied to technology standards and new standards in mathematics and English language arts.

The Statewide Strategic Plan for Science is a comprehensive plan addressing various components of reform, including standards development, curriculum development, professional development, assessment, materials support, and administrative and community support. If supported, it will lead to revised NY science standards that are contemporary and prepare our students for their future.

STANYS Suffolk Section is ready to help and is prepared to assist in the implementation of the Statewide Strategic Plan for Science next year.

Sincerely,

Glen Cochrane
Chairperson STANYS Suffolk

cc: Commissioner John King
Deputy Commissioner Ken Wagner
Regent Roger Tilles



800 Troy-Schenectady Road, Latham, NY 12110-2455 ■ (518) 213-6000 ■ www.nysut.org

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Andrew Pallotta, *Executive Vice President*
Catalina R. Fortino, *Vice President*
Paul Pecorale, *Vice President*
Martin Messner, *Secretary-Treasurer*

December 3, 2014

Mr. Ken Wagner
Deputy Commissioner
Office of Curriculum, Assessment, and Educational Technology
New York State Education Department
875 Education Building Annex
Albany, New York 12234

Dear Ken:

On behalf of NYSUT, I am submitting comments on the draft New York Statewide Strategic Plan for Science. We are concerned about the need to improve P-12 science education statewide given that the New York State Learning Standards in Science [as part of the New York State Learning Standards in Math, Science and Technology (MST)] have not been reviewed or revised since the MST standard was established in 1996. The ambitious and comprehensive draft Strategic Plan appropriately includes a mission and vision that incorporate six critical components simultaneously - Standards, Curriculum, Professional Development to Enhance Instruction, Assessment, Materials and Resource Support, and Administrative and Community Support.

NYSUT has and continues to steadfastly support higher learning standards for all students and fair and valid assessments to measure student performance aligned with these standards. With the primary focus on ELA and math, often at the expense of other subjects, such as science, we are pleased that the science standards are being given the critical attention and review they deserve to keep our students current with the science knowledge and skills necessary for the 21st century. This plan has the potential to build trust in these education reform initiatives by giving teachers the time and resources to do what is right for students.

Before adoption and implementation of new P-12 New York State Science Learning Standards can occur, the Board of Regents must address P-16 systemic and program implications. Serious consideration of the realities of the classroom and the amount of time actually devoted to science instruction, especially at the elementary level, and the impact of new standards on the field must be addressed. Full funding and investment in classroom-based laboratories and science materials, professional development, curricular guidance, assessments, materials and resources, and administrative and community support is not only necessary, but imperative for the successful implementation and adoption of any new science standards. The Plan should also incorporate strategies to increase the capacity and funding of higher education pre-service programs to recruit and prepare more science teachers.

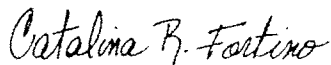
The Plan should recognize the role of Teacher Centers and the NYSUT Education Learning Trust as additional effective tools for professional training for teachers, teaching assistants and lab assistants who work in science programs. Resources to build stronger connections between teachers of science and higher education science faculty should also be considered. Rich professional development should include the establishment of summer experiences, including internships, for science educators.

NYSUT has long standing policy on the need for the practitioner's voice. Science educators need to be part of any deliberation to ensure the quality, development and implementation of new P-12 New York State science learning standards and 5-year strategic plan. We urge that the Department fully engage teachers at every level of test development to strengthen the credibility in the assessments. Additionally, the State Education Department should take all necessary steps to ensure that the public, parents and the community remain confident that new State science assessments fairly and accurately measure new science standards.

Research-based information on effective instructional strategies for English Language Learners and students with disabilities must be incorporated in the development process of any science curriculum, materials, resources and professional development programs for teachers and other school personnel rather than as add-ons to those materials and programs.

Thank you for the opportunity to submit comments on this draft Strategic Plan. NYSUT stands ready to work with the State Education Department on the Statewide Strategic Plan for Science which has the potential to improve the quality of science education for all our learners.

Sincerely,



Catalina Fortino
Vice President

CF/TM/mc – 98588

cc: Cosimo Tangorra, Deputy Commissioner for P-12 Education



LONG ISLAND SCIENCE EDUCATION LEADERSHIP ASSOCIATION, INC.

www.lisela.org

David Casamento, President, East Williston Schools

December 4, 2014

Dr. Merryl H. Tisch
Chancellor
New York State Board of Regents
State Education Building
89 Washington Avenue
Albany, NY 12234

Dear Dr. Tisch,

Long Island Science Education Leadership Association (LISELA) is an organization that provides support to Long Island science administrators, receives input and feedback from all science teachers, provides professional development to administrators and teachers, and provides monetary awards for student achievement in science. LISELA understands that the Board of Regents received a Statewide Strategic Plan for Science at its October, 2014 meeting and will consider adoption of the Plan in January, 2015.

As an organization, we met in mid-November, and had representatives from across all of Long Island. Together, we parsed the strategic plan document in order to ascertain the sentiment of the Long Island districts present that day. As a group, it was agreed that we would strongly recommend that the Board of Regents adopt the Statewide Strategic Plan for Science and begin the development of new State science learning standards early next year.

Our current State science learning standards were adopted in 1996 and the world of science and what we know about teaching and learning science has changed. Our State science standards should reflect the current state of understanding about the natural world and how best to teach what we know to children and young people.

In terms of the NGSS standards, our organization believes that it is important to provide common experiences for science exposure and exploration across the state. Setting state-wide curriculum for P-12 will ensure continuity and uniformity across the state and will support the needs of students who may move from district to district. The elementary NGSS standards should be adopted as is, the middle level standards should be adapted to provide district flexibility in terms of acceleration, and the physical science standards for high school should be rewritten to be content specific (earth science, chemistry, physics) and be delivered as three separate courses. The high school biology standards can be adopted as written in the NGSS document. We also believe the elementary and middle level assessments should be maintained, but updated to reflect the new standards. In addition, we believe that an overall plan for eighth grade acceleration should be adopted in the new standards.

However, we also realize that in adopting new standards, there will need to be an intense amount of time and resources devoted to professional development, curriculum writing and assessment, and the development of supporting resources. LISELA would like to strongly urge the BOCES to partner with the various STEM hubs and Universities to provide resources in order to ensure equity across the State. As written, these new standards will require significant teacher training in the areas of technology and

engineering. LISELA stands ready to provide some of the professional development that will certainly be need to accompany these new standards.

We fully support the integration of the new science standards with the Common Core. To this end, we also believe that new assessments should reflect these standards in addition to the technology and engineering performance standards that will make our students competitive and ensure more young people pursue STEM-related careers.

We are also strongly in favor of the five-year timetable for reform involving a diverse body of stakeholders who can contribute to the various components of reform, including standards development, curriculum development, professional development, assessment, materials support, and administrative and community support. We understand that the Plan was developed by the State in collaboration with practicing science educators and with many science educator professional associations. Thus, the Plan already has widespread support from the science education community. This support will help ensure that the Plan will be successfully implemented.

We trust that the Board of Regents will provide the necessary leadership to move science education forward in New York State. The Strategic Plan provides a viable and research-based roadmap to accomplish these goals.

Sincerely,

David M. Casamento
President, LISELA

CC: Dr. John King
Ken Wagner
Anthony S. Bottar, Vice Chancellor
Robert M. Bennett, Chancellor Emeritus
Dr. James C. Dawson, Regent
Harry Phillips, III, Regent
James R. Tallon, Jr, Regent
Roger Tilles, Regent
Charles R. Bendit, Regent
Dr. Betty A. Rosa, Regent
Dr. Lester Young, Jr, Regent
Dr. Christine D. Cea, Regent
Wade S. Norwood, Regent
Dr. Kathleen M. Cashin, Regent
James E. Cottrell, Regent
Andrew T. Brown, Regent
Josephine Victoria Finn, Regent



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December 11, 2014

Dr. Ken Wagner
Deputy Commissioner for Curriculum,
Assessment, and Education Technology
New York State Education Department
89 Washington Avenue
Albany, New York 12234

Dear Dr. Wagner,

We understand that the Board of Regents received a Statewide Strategic Plan for Science at its October, 2014 meeting and will consider adoption of the Plan in January, 2015.

As an industrial stakeholder seeking the highest quality science education for all of our P-12 students, we recommend that the Board of Regents adopt the Statewide Strategic Plan for Science and begin the development of new State science learning standards early next year.

There are several reasons underlying our recommendation. First, our current State science learning standards were adopted in 1996 and the world of science and what we know about teaching and learning science has changed. Our State science standards should reflect the current state of understanding about the natural world and how best to teach what we know to children and young people.

Second, the process of developing new science standards will enable the State to draw upon contemporary resources, including the Next Generation Science Standards where science and engineering practices, disciplinary knowledge, and cross-cutting concepts have been fully integrated into the expectations for student performance. The process will also enable the new science standards to be tied to technology standards and new standards in mathematics and English language arts.

Third, the Strategic Plan provides a feasible and comprehensive five-year timetable for reform involving a diverse body of stakeholders who can contribute to the various components of reform, including standards development, curriculum development, professional development, assessment, materials support, and administrative and community support. In addition, the Plan was developed by the State in collaboration with practicing science educators and with many science educator professional associations. Consequently, the Plan already has widespread support from the science education community. This support will help ensure that the Plan will be successfully implemented.

Finally, there is much discussion about the need for our State and nation to be globally competitive and for more of our young people to pursue STEM-related careers. These needs cannot be addressed with so many of our students graduating from high school without a strong background in physical science or with experiences in school science that fail to inspire and encourage them to pursue the subject in college and in their careers. We believe that the Strategic Plan provides a viable and research-based roadmap in order to prepare the next generation of scientists and engineers.

We trust that the Board of Regents will provide the necessary leadership to move science education reform forward in New York State.

Sincerely,

A handwritten signature in cursive script that reads "Danielle Merfeld". The signature is written in black ink and is positioned below the word "Sincerely,".

Danielle Merfeld, Ph.D.
Technology Director
GE Global Research



KEVIN S. CASEY
Executive Director

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December 17, 2014

The Honorable Merryl H. Tisch, Chancellor
New York State Board of Regents
New York State Education Department
89 Washington Avenue
Albany, New York 12234

Dear Chancellor Tisch:

In March and October 2014, the Board of Regents discussed the evolution of science standards and science education in the context of a Statewide Strategic Plan for Science. The Strategic Plan is scheduled to be presented again to the Board in January 2015, as an action item. The School Administrators Association of New York State recommends that the Strategic Plan be adopted and implemented.

There are at least two compelling rationales supporting the implementation of the Strategic Plan.

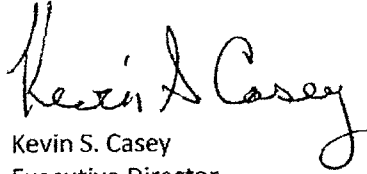
First, there is need to carefully consider and deliberate survey results from 4,318 respondents pertaining to the relative strengths of the New York State Science Learning Standards and the Next Generation Science Standards and to develop a recommended course for New York State.

Second, science education needs to come into alignment with the mathematics and English language arts common core standards that are now in place. For example, the mathematics concepts and operations in mathematics classes and in science classes should be mutually reinforcing in an aligned and grade appropriate manner thereby promoting deeper learning with more and different application opportunities.

The Strategic Plan should result in well-articulated, grade-by-grade, standards and expectations. This will promote and facilitate joint interdisciplinary planning by teachers. In order to ensure that the new science standards are accessible to all educators, the end product must be developed in a manner that is sensitive to two types of educators – common branch educators at the elementary school level and science educators at the secondary school level.

We are grateful for this opportunity to comment upon and express support for the Strategic Plan for Science.

Very Sincerely,

A handwritten signature in black ink that reads "Kevin S. Casey". The signature is written in a cursive style with a large, stylized "K" and "C".

Kevin S. Casey
Executive Director

Cc: Commissioner John B. King, Jr.
Senator John J. Flanagan
Assemblywoman Catherine T. Nolan

New York State Science Education Consortium

A cooperative association of professional science education organizations

80 Nott Terrace
Schenectady, New York 12308
Phone: 518-631-9870

The Honorable Dr. Merryl H. Tisch
Chancellor
Regents Office
State Education Building
89 Washington Avenue
Albany, New York 12234

December 29, 2014

Dear Dr. Tisch:

In October, the Board of Regents received an item from Dr. King and Dr. Wagner concerning the possible adoption of a Statewide Strategic Plan for Science in early 2015. You will note from that item that the New York State Science Education Consortium has been working with the Department's Associates in Science Education, Will Jaacks and Ann Crotty, to support their preparation of this Plan for Regents consideration and possible adoption. I am writing to you as Facilitator of the Consortium since its founding in 2000 and as a secondary school and college science educator for the past 47 years. From 1987 through 1993, I was an Associate in Science Education for the State Education Department, supervising curriculum, assessment, and professional development in biology and chemistry for the state. For the last several years, I have been implementing a Graduate Level Clinically Rich Teacher Preparation Pilot Project with RTTT funds awarded to Union Graduate College by NYSED.

The Consortium recommends and urges you and the Regents to adopt the Statewide Strategic Plan for Science in the very near future so we can begin the process of reforming a science education program that no longer meets the needs of our students and, in fact, is placing the economic vitality and security of our state at risk. The Strategic Plan does not commit the Regents to adopting Next Generation Science Standards (NGSS) or any other set of science standards. Rather, the Plan will initiate a process where science educators and other stakeholders will analyze the current program, review contemporary science standards from a number of sources, and propose to the Board a viable design and approach to revise and/or develop P-12 science standards appropriate to New York State.

There are several major reasons for this recommendation. First, new science standards will re-invigorate inquiry-based science learning in grades K-8. The fact that elementary and middle school students perform reasonably well on the state's fourth and eighth grade science assessments is due to the lack of rigor of these dated assessments when compared to the new state assessments in Common Core ELA and Mathematics. Until we revise these assessments, elementary and middle level science learning will continue to erode as schools direct even more attention and resources towards improving students' achievement in ELA and Math. What we need are new science standards that can be integrated with Common Core standards to enhance student achievement in all three subjects. Second, at the high school level, only one-third of our students are completing a balanced and rigorous science program involving Regents coursework in earth, life, and physical science. Less than one-half of our students are sitting for the Regents Chemistry Examination each year and less than one-quarter are completing Regents Physics. Student participation and achievement in all Regents science courses has been flat for several years. We had hoped years ago that these courses would pump up more students to greater career and college readiness; instead, they have served to filter out the very students who need more physical science to prepare for the exploding career possibilities in health and advanced technologies. So what we need are new state science standards that promote programs that are more accessible and flexible, developing basic scientific literacy in all students while preparing them for careers suited to their backgrounds and interests. Finally, the Strategic Plan provides a five-year roadmap that can achieve lasting reform in science education, building the professional ownership, partnerships and resource support networks that are critical to its successful implementation.

The past several years have been especially challenging in education; for students and parents, school teachers and administrators, and policy makers. In a state as large and as diverse as New York, we understand that navigating educational reform is extremely difficult and fraught with peril. Critics abound and some provide worthy commentary. But, at the end of the day, one has to ask if our students and schools would now be better off if New York had refused to participate in the Race to the Top competition? If it had refused to adopt the Common Core standards? As science educators, I believe we would answer no to both questions, provided that the reform can now turn to those other curriculum areas needing attention. The Strategic Plan for Science presents a new opportunity for leadership on the part of the Board of Regents and a chance to demonstrate that our state still has the capacity to prepare and implement standards that couple the best thinking and innovative spirit of New Yorkers to create something very special for the children in our care. They deserve our best efforts and we can ill afford not to provide it. Where there is current confusion and fragmentation of effort, the Regents can focus and direct the energies of all those who hold a stake in quality science education for our children. In leading this effort, you will not find the professional science educator associations wanting in their understanding, ability, support and devotion to the cause. It is time to move forward.

Respectfully,

Bruce Tulloch, Facilitator

cc: Dr. John King, Jr.; Dr. Ken Wagner