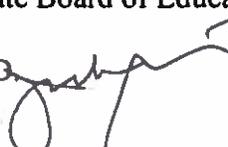




Jack R. Smith, Ph.D.
Interim State Superintendent of Schools

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TO: Members of the State Board of Education
FROM: Jack R. Smith, Ph.D. 
DATE: January 26, 2016
SUBJECT: Maryland Science Program/Every Student Succeeds Act (ESSA) Amendment

PURPOSE:

The purpose of this agenda item is to provide information and an update regarding the implementation of the Next Generation Science Standards (NGSS), which have been adopted as the Maryland State Science Standards.

BACKGROUND/HISTORICAL PERSPECTIVE:

The College and Career Readiness – Science Connection

Economic and education statistics make it clear that the United States is not educating enough students who can succeed in a global information economy fueled by advances and innovation in science, engineering, and technology. Research findings indicate that our current system of science education, which places more value on science as a knowledge base than as a way of thinking, is ineffective. Too few students are experiencing success in postsecondary institutions and therefore lack the wherewithal to qualify for gainful employment, including STEM fields, where the nation is seeing the most growth in jobs. They are, in effect, being closed out of middle class opportunities. This shift in emphasis requires that we control the amount and kind of content, giving priority to powerful concepts that have currency because of their utility in explaining phenomena, predicting outcomes or displaying broad applicability in many fields, and that we use the practices in conjunction with core content throughout the grades. The Framework for K-12 Science Education identifies the content students are expected to know in order to be scientifically literate and to have an adequate foundation for further study and that content was deemed appropriate for success in college and career by science education experts and postsecondary instructors and employers.

In closing, when it comes to developing standards, rigorous content is an important indicator of student readiness for success in postsecondary education and careers, but it is not enough. Proficiency with science and engineering practices is also an indicator of readiness, but it is not sufficient in the absence of rigorous content. In the end, as the research shows, it is the science and engineering practices learned in conjunction with rigorous content that best prepares students for success in postsecondary education and careers.

NGSS, Appendix C, pp. 12-13:

<http://www.nextgenscience.org/sites/ngss/files/NGSS%20Appendix%20C%20Final%20072613.pdf>

Background

Maryland requires all high school students to complete at least three science courses, each of which includes laboratory experiences. All students must take biology and the remaining two courses can include any or all of the following areas: earth science, life science, physical science, environmental science. Maryland had six science standards, with Standard 1.0 (Skills and Processes) organized in grade bands, Pre-K–2, 3–5, 6–8, and the remaining five standards arranged regarding learning progressions, connections, and grade level appropriateness. Each Local Education Agency (LEA) had the option to localize the state curriculum by either identifying particular state standards to be taught in specific grades or by constructing a science curriculum using the state standards. Presently, Maryland assesses students are assessed in science in grades 5 and 8 using the Science Maryland School Assessment (MSA) which includes both Selected Response (SR) items and Brief Constructed Response (BCR) items. High school students are assessed in biology on the Biology High School Assessment (HSA); this assessment included SR and BCR items until 2009 when the format was changed to only SR items to accommodate faster return of results. Historically, Maryland has recognized the need for rigorous standards based on the “big ideas” and “practices” of science, and therefore was well positioned to adopt the NGSS once developed.

Alliances, Infrastructure, and Partner Organizations

Maryland has pooled resources with organizations, alliances, and higher education institutions regarding P–12 education, and these associations are assisting with issues surrounding communications, instruction, and development, among others. The Maryland Business Roundtable for Education and Maryland Public TV are two large alliances with which MSDE collaborates on a plethora of education topics, specifically developing resources and opportunities for teachers and students. Maryland also works closely with partner organizations (e.g., Higher Education Institutions, Maryland Association of Science Teachers; Maryland Science Supervisors Association; University of Maryland Center for Environmental Science; University of Maryland College Park; Maryland Science Center; Northrup Grumman; Tech Council of Maryland; and Hackerman Academy of Mathematics and Science) to develop curriculum and professional development.

Process for Developing the Next Generation Science Standards (NGSS)

State teams provided continuous guidance and feedback throughout the *Next Generation Science Standards* development process. These teams included representatives from the K–12 education, education policy, post-secondary science education, and informal science communities. All states were invited to apply to be Lead State Partners in order to take a leadership role in the NGSS process from the beginning. Twenty-six Lead State Partners, of which Maryland was one, were selected to guide the writing team and work to develop plans for adoption, implementation, and transition that can be considered by all states.

The writing team was composed of 41 members from 26 states and represented K–12 and postsecondary education, and the scientific, engineering, and business communities. The members have expertise in cognition, life, earth, and physical sciences, and engineering. The team was charged with developing draft standards true to the NRC *Framework for K–12 Science Education*.

The final release of the NGSS occurred in April 2013, and to date fifteen states and the District of Columbia have adopted the NGSS. Maryland was the fourth state to adopt on June 25, 2013. The four attached documents provide an overview of the implementation of the standards, the instructional outcomes, and assessment progression they are designed to achieve.

EXECUTIVE SUMMARY:

As Dr. S. James Gates, Jr. told science supervisors in May 2015, “The implications are pretty clear. If we want to have a citizen-based workforce that is equipped with the STEM-capable skills to advance the Nation’s economic interest, we cannot continue to teach science as if it is for only an elite few.”

Maryland has applied this philosophy to all facets of the process of development and implementation; collaboration with all stakeholders has been a major focal point. Local teachers, business partners, community members, and institutes of higher education have been an integral part of the implementation and professional development planning. In addition, local science supervisors, assistant superintendents, and superintendents have been critical partners in the decision making process for both implementation and planning for assessing the Standards. Through local site visits and regional meetings, documents have been developed to inform the implementation timelines, identify success, challenges, and the needs of all 24 districts in order to foster collaboration, and build a community of learners.

Performance expectation (PE) selections for the Maryland Integrated Science Assessment (MISA) will focus on the Crosscutting Concepts and Science and Engineering Practices that allow students to become scientifically literate and able to successfully respond to rigorous assessments based on the Disciplinary Core Ideas which will best prepare students for success in college and careers. Bundling of PEs will be done with attention to assessment tasks based on authentic phenomenon. The

assessments will be developed using a variety of performance expectations found in the NGSS that reflect progression across grades 3-12.

ADDITIONAL RESOURCES:

<http://tinyurl.com/MarylandNGSS>

<http://www.nextgenscience.org/>

<http://www.nextgenscience.org/sites/ngss/files/How%20to%20Read%20NGSS%20-%20Final%204-19-13.pdf>

MSDE eConnect science resources: <http://msde.blackboard.com>

- Engaging Students in Scientific Practices: What does constructing and revising models look like in the Science Classroom?
- Talking Science – Developing Productive Discussions in the Science Classroom
- NGSS Round Table: Instructional NGSS Resources
- Teaching and Learning in a Next Generation Science Classroom Teachers: Grade 1-2; Grade 2-3; Grade 4-5
- Teaching and Learning in a Next Generation Science Middle School Classroom
- Teaching and Learning in a Next Generation Science High School Classroom
- Explanation in the Science Classroom 6-12
- Argument in the Science Classroom 6-12

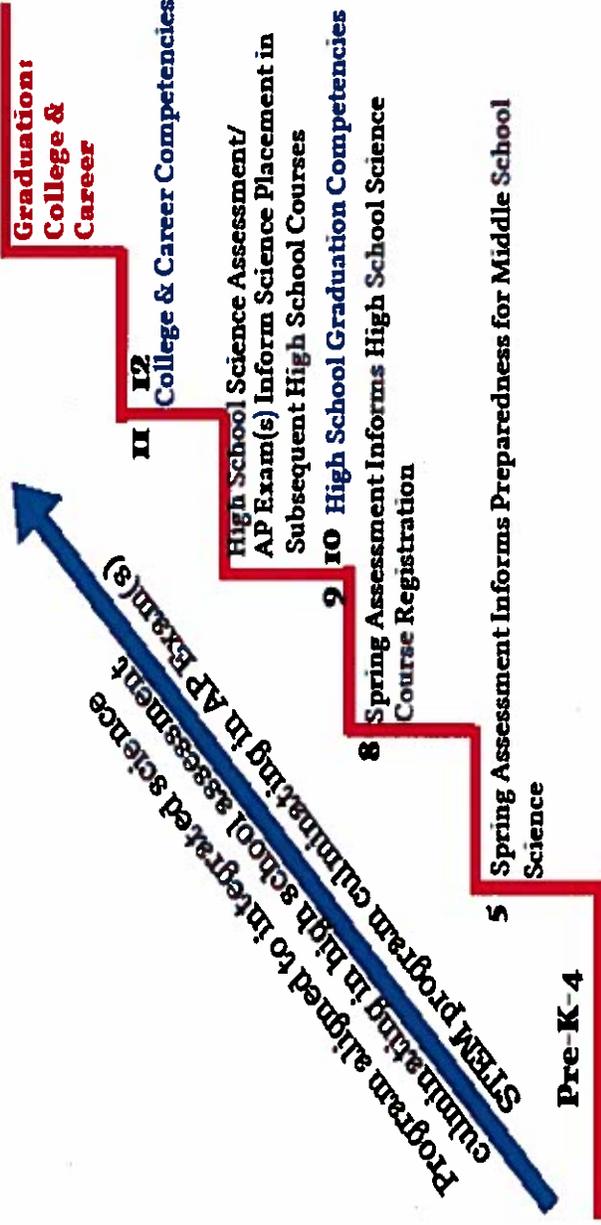
ACTION:

For information only.

Attachments



Maryland Integrated Science Assessment Design (MISA)



Assessment Designs...

- are part of developing an assessment system that reflects science as a unique entity with the practices, crosscutting concepts, and disciplinary core ideas.
- provide predictors that allow parents and students to collaborate on next steps in science education through a comprehensive integrated science assessment approach in grades 5, 8, & high school.
- motivate instruction across all grade levels, especially the elementary grades.
- minimize disruption of school schedules by chunking the assessment into instructional blocks of time.
- include collaboration with LEAs in decision making and selection of Performance Expectations (PEs) throughout the development process.



Maryland Integrated Science Assessment (MISA) Design

Grade 5 & 8 Maryland Integrated Science Assessment Overview:

Assessment will continue to be given in the Spring (March) and incorporate Performance Expectations (PEs) from previous grades. For example:

- Grade 5 will assess PEs from grades 3, 4, and identified PEs from 5 (and may also include the earlier years).
- Grade 8 will assess PEs from grades 6, 7, and identified PEs from grade 8 which build on all previous years.

Grade 5 & 8 Plan:

- Testing/field testing begins in Spring 2017 with no fault to students (*pending the approval of USED and the State Board*). This would be considered a field test year.
- Standard setting to occur in Spring/Summer 2017.

High School Maryland Integrated Science Assessment Overview:

Assessment will be given when students reach the end of the identified subset of high school PEs, which build on PEs from previous grades. For example:

- Identified PEs will be a subset of the standards found in the high school grade band.
- The information received from the assessment by the LEAs may be used to inform science placement in subsequent high school courses.

For the Maryland Integrated Science Assessment at the high school level, the graduation requirement can be met in one of two ways (*pending the approval of USED and the State Board*):

- (1) MSDE assessment given at the completion of the identified subset of the Maryland State Science Standards. Students will be able to take the assessment at any grade in high school if the LEA determines the student has received instruction in that subset of standards and are deemed to be ready for the assessment.
- (2) If a student passes an AP exam, with a score of 3 or higher, in specific science content. For example: biology, chemistry, environmental science, or physics.

The Maryland State Integrated Science Assessment will necessitate courses based on the Maryland State Science Standards so that PEs needed for the assessment are addressed in the students' science course(s). LEAs collaborated in the determination of the identified PEs.

High School Plan:

Students' graduation requirement will be determined based on when they take the High School MISA:

- **2017-2018** Students taking the High School MISA in 2017-2018 will be required to participate (not pass) as the high school graduation requirement in science. These students will be taking the field test with no fault to students (*pending the approval of USED and the State Board*).
- **2018-2019** Students taking the High School MISA in 2018-2019 will be required to participate (not pass) as the high school graduation requirement in science. These students will be taking the operational test with no fault to students (*pending the approval of USED and the State Board*).
- **2019-2020** Students taking the High School MISA in 2019-2020 will be required to meet new high school graduation requirements in science. These students will take the operational assessment and will be required to pass the assessment for graduation.

Students who have already taken the biology assessment (grades 10, 11, and 12) could use this as their high school graduation requirement.

- A biology assessment will continue through 2016-2017 in order to accommodate students who took biology and did not pass.
- Bridge projects aligned to CLGs would continue through 2016-2017. Bridge projects aligned to the Maryland State Science Standards will be implemented starting in 2019-2020.

Maryland State Integrated Science Assessment Progression Elementary/Middle School

ATTACHMENT III



Ongoing Consistent Messaging: Professional Learning; Instructional Shifts; Development and Implementation of Formative Assessments Ongoing Statewide coordination and collaboration to support Teachers, Supervisors, and Administrators			
2014-2015	2015-2016	2016-2017	2017-2018
Content Alignment <ul style="list-style-type: none"> LEA integration of Maryland State Science Standards with a focus on the 3 dimensions Science MSA aligned to the State curriculum 	Content Alignment <ul style="list-style-type: none"> Maryland State Science Standards' instructional shifts in place statewide Maryland Integrated Science Assessment field tests aligned items 	Content Alignment <ul style="list-style-type: none"> Full implementation of Maryland State Science Standards Maryland integrated Science Assessment aligned to Maryland State Science Standards 	Content Alignment <ul style="list-style-type: none"> Full implementation of Maryland State Science Standards Maryland Integrated Science Assessment aligned to Maryland State Science Standards
Test Administration <ul style="list-style-type: none"> Science MSA given in Spring 2015 for grades 5 and 8 	Test Administration <ul style="list-style-type: none"> Maryland Integrated Science Assessment given in March of grades 5 and 8 with integrated field test items 	Test Administration <ul style="list-style-type: none"> Maryland Integrated Science Assessment given in March of grades 5 and 8 	Test Administration <ul style="list-style-type: none"> Maryland Integrated Science Assessment given in March of grades 5 and 8
Accountability <ul style="list-style-type: none"> Science MSA reported to meet federal reporting requirements 	Accountability <ul style="list-style-type: none"> Science MSA reported to meet federal reporting requirements 	Accountability <ul style="list-style-type: none"> Maryland Integrated Science Assessment testing with no fault to students (pending USED and State Board approval) 	Accountability <ul style="list-style-type: none"> Maryland Integrated Science Assessment: reported to meet federal reporting requirements
Parent/Community Communication			
<ul style="list-style-type: none"> Parent/Community Resources from LEAs posted on website Develop common messages and general outreach on instructional shifts Continued communication on Maryland State Science Standards & Assessments "NGSS Fact Sheet for Parents" "NGSS Messaging Cards" "10 Questions Your Kid's Science Teacher Wishes You Would Ask" "NGSS 101 for General Audience" "Attitudes Toward Science Education" "Why K-12 Standards Matter" 			

Maryland State Integrated Science Assessment Progression High School

ATTACHMENT IV



Ongoing Consistent Messaging: Professional Learning; Instructional Shifts; Development and Implementation of Formative Assessments Ongoing Statewide coordination and collaboration to support Teachers, Supervisors, and Administrators			
2014-2015	2015-2016	2016-2017	2017-2018
<p>Phase 2 2014-2015</p> <p>Content Alignment</p> <ul style="list-style-type: none"> LEA integration of Maryland State Science Standards with a focus on the 3 dimensions Define course sequence aligned with identified PEs Biology HSA aligned to the Core Learning Goals (CLGs) 	<p>Phase 3 2015-2016</p> <p>Content Alignment</p> <ul style="list-style-type: none"> Maryland State Science Standards' instructional shifts in place statewide Implement course sequence aligned with identified PEs Introduce Maryland State Science Standards aligned course(s) Grade 10: Biology HSA aligned to CLGs given (final year) 	<p>Phase 4 2016-2017</p> <p>Content Alignment</p> <ul style="list-style-type: none"> Full implementation of Maryland State Science Standards Continue to implement/introduce aligned integrated course(s) Maryland Integrated Science Assessment aligned to Maryland State Science Standards (field testing) 	<p>Phase 5 2017-2018</p> <p>Content Alignment</p> <ul style="list-style-type: none"> Full implementation of Maryland State Science Standards Maryland Integrated Science Assessment aligned to Maryland State Science Standards (field testing)
<p>Test Administration</p> <ul style="list-style-type: none"> Biology HSA given at the completion of a CLG-aligned Biology course 	<p>Test Administration</p> <ul style="list-style-type: none"> Biology HSA given at the completion of Biology (final year) 	<p>Test Administration</p> <ul style="list-style-type: none"> Assessment given after completion of the LEA course at the end of the identified subset of Maryland State Science Standards 	<p>Test Administration</p> <ul style="list-style-type: none"> Assessment given after completion of the LEA course at the end of the identified subset of Maryland State Science Standards
<p>Accountability</p> <ul style="list-style-type: none"> Biology HSA reported to meet federal reporting requirements Biology HSA graduation requirement Bridge Projects aligned to Biology CLGs 	<p>Accountability</p> <ul style="list-style-type: none"> Biology HSA reported to meet federal reporting requirements Biology HSA graduation requirement Bridge Projects aligned to Biology CLGs 	<p>Accountability</p> <ul style="list-style-type: none"> Maryland Integrated Science Assessment field testing with no fault to students (pending USED and State Board approval) High school science assessment graduation requirement TBD 	<p>Accountability</p> <ul style="list-style-type: none"> Maryland Integrated Science Assessment field testing with no fault to students (pending USED and State Board approval) High school science assessment graduation requirement TBD
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<p>Phase 6 2018-2019</p> <p>Content Alignment</p> <ul style="list-style-type: none"> Full implementation of Maryland State Science Standards Maryland Integrated Science Assessment aligned to Maryland State Science Standards (field testing) 	<p>Phase 7 2019-2020</p> <p>Content Alignment</p> <ul style="list-style-type: none"> Full implementation of Maryland State Science Standards Maryland Integrated Science Assessment aligned to Maryland State Science Standards (field testing) 	<p>Test Administration</p> <ul style="list-style-type: none"> Assessment given after completion of the LEA course at the end of the identified subset of Maryland State Science Standards 	<p>Test Administration</p> <ul style="list-style-type: none"> Assessment given after completion of the LEA course at the end of the identified subset of Maryland State Science Standards
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Attachment – Tab

Maryland State Science Standards Update

January 26, 2016

Dr. Henry Johnson, Interim Deputy State Superintendent
Heather Lageman, Director of Curriculum

Agenda

- Overview
- Timeline
- LEA Elementary Implementation
- LEA Secondary Implementation
- Next Steps

Dr. S. James Gates, Jr

- “The implications are pretty clear. If we want to have a citizen-based workforce that is equipped with the STEM-capable skills to advance the Nation’s economic interest, we cannot continue to teach science as if it is for only an elite few.”



Where we are now in the journey?

- Work has centered around statewide
 - Communication
 - Capacity and network building
 - Professional learning
 - Focus on instructional shifts
 - Focus on evaluating materials and curriculum

Maryland State Science Standards Events

□ **MSDE LEA Visits**

- Summer 2015
- All LEAs visited to discuss implementation plans

□ **Assistant Superintendent Meetings (monthly)**

- Maryland State Science Standards updates and discussion
- Collaboration with Science Supervisors

□ **MSDE Science Supervisor and Curriculum Specialists Briefings (Quarterly)**

- Professional learning & LEA resource sharing
- Direct communication with Achieve and National Science Teacher's Association

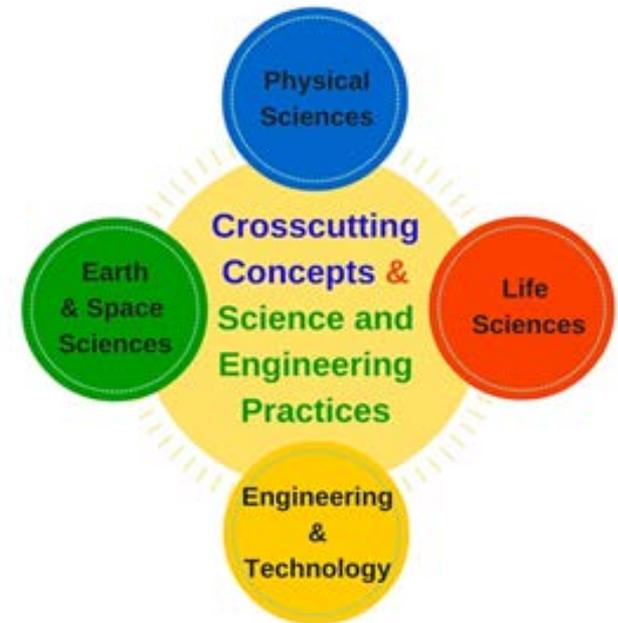


Process for Implementation

- Collaborative work with LEAs on
 - Content alignment
 - Professional development
 - Materials selection
 - Flexible course sequencing
 - Defining assessment
 - Content
 - Timing

Overview of Maryland's Integrated Assessment

- Focus on the Crosscutting Concepts and Science and Engineering Practices
- Performance expectations (PE) that allow students to become scientifically literate will be measured across grade levels.
- The MISA will be developed using a variety of PEs that reflect knowledge of the Maryland Science Standards.



LEA Implementation

- ❑ James Peters, Supervisor of Science
Carroll County Public Schools
- ❑ Brian Raygor, Supervisor of Science &
STEM
Wicomico County Public Schools

Timeline

Meeting with LEA Science Supervisors	October 29, 2015
Assessment Meeting with Science Supervisors	November 23, 2015
Presentation to PSSAM for Input	December 4, 2015
Science Briefing to LEA Science Supervisors	December 9, 2015
Discuss final recommendations with Assistant LEA Superintendents with Science Supervisors	December 18, 2015
Presentation to PSSAM for Input	January 8, 2016
State Board Update	January 26, 2016

Waiver Request

- Maryland is requesting a waiver for field testing the Maryland Integrated Science Assessment with no fault to students for 2016-2017 for Grades 5 and 8, as well as a waiver for operational testing the Maryland Integrated Science Assessment with no fault to students for 2017-2018 for Grades 5 and 8.
- Additionally, Maryland is requesting a waiver for field testing the Maryland Integrated Science Assessment for high school with no fault to students for 2017-2018, as well as a waiver for operational testing the Maryland Integrated Science Assessment for high school with no fault to students for 2018-2019.