



VMSC

Virginia Mathematics
& Science Coalition

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- Virginia Board of Education
- Committee on School and Division Accountability
- July 23, 2014

Overview

- **VMSC & K-5 Science**

- Importance of K-5 Science
- Strong Tradition in Virginia
- 2014 Legislation: Pro & Cons
- Assessment Guidelines: Pro & Cons

- **Changing the Dynamics**

- The VISTA Vision: High Quality Curriculum & Assessment
- The Reality: Division and School-Level Barriers

- **Moving Forward: Changing the Reality**

- 2014-2015: Small Steps
- Building Upon VISTA
- Leveraging MSP & Other Funds

STEM Pipeline: K-5 Is Essential

- ❑ Science-rich experiences, in and out of school, generate a feeling of competency.
- ❑ Tinkering, model building, and inquiry create a sense of control and personal accomplishments.
- ❑ Teachers who provide interactive environments for exploring science are inspirational – e.g Programs That Work awardees
- ❑ Positive experiences are related to the selection of STEM careers and to possessing the foundation for higher-level coursework.

High Quality K-5 Experiences

Curriculum: Emphasizes inquiry-based practices, the nature of science, and core disciplinary and cross-cutting concepts.

Assessment: Addresses the wide range of higher-order scientific practices and conceptual understandings necessary for college and career readiness.

Accountability: Includes a matrix of valid, reliable, and feasible options that can be implemented at the school, division and/or state level, not just multiple choice-tests.

Credit: VMSC Position on Science Standards of Learning, Assessment, and Accountability (January 2014)

Virginia's K-5 Science: 20 Years

Strong Vision

- **SOL.1** focuses on scientific inquiry, reasoning, and logic
- Every SOL begins with “**investigate and understand**”
- Emphasis on **real-world** connections, cross-disciplinary connections, and technology
- Solid **connections** among VDOE, local divisions, and professional organizations
- Enhanced Scope and Sequence (**ESS**) **lessons** integrate SOL.1, higher-level conceptual understandings, and assessment options

Virginia's K-5 Science: 20 Years

Strong Outcomes

- Consistently **high percentage passed** Grades 3 and 5 SOL tests, which have increased in difficulty
- High scores on **Grade 4 NAEP**
- Highly rated by **Fordham Foundation**
- **Statewide data** for monitoring progress and providing professional development to under achieving school divisions

2014 Legislation: Impact?

Potentially Pros

- **Reduced use of traditional assessment** – *focuses on what do and do not know*
- **Increased use of alternative assessments** – *focus on what can and can not do using scoring protocols including rubrics*
 - **Performance** – *demonstrate knowledge and skills*
 - **Authentic** – *related to setting outside classroom*
 - **Cross Disciplinary**
 - **Portfolios**
- **Improved climate** for implementing high-quality inquiry-oriented curricula, with instruments that are instructionally sensitive to this type of instruction
- **Professional development** for teachers

2014 Legislation: Impact?

Potentially Cons

- **No statewide data** prior to Grade 5 SOL for student, school, or division comparison
- **Reduced instruction** in science because of narrowing of curriculum to subjects required by NCLB - reading and mathematics - and preparation for these tests
- **Inappropriate instruction** in science, e.g. reading about “science topics”
- Unwillingness to **provide adequate time** for high quality science curricula that incorporate literacy and numeracy, despite data that this approach does not hinder, and often increases, achievement in all subjects

VMSC Recommendations for Assessment Guidelines

- Standards - **SOL based** (validity)
- **Higher-order cognitive skills** that support transferable learning
- Addresses **SOL.1** (scientific investigation, reasoning and logic) and grade-level **disciplinary concepts** from one or more strands
- Includes **student-constructed** responses
- Scored with **protocols** (rubrics)
- Teachers receive staff **professional development**
- **Use of division-level accountability** to ensure consistent expectations within division and adherence to SOL.

Initial Review of Draft Guidelines

Potential Pros

- Addresses each **SOL strand**
- **Division**, not school, certifies instruction and assessment
- **School** developed assessments require a written plan.
- **VDOE** site visits and/or telephone interviews
- Can use a **combination** of assessments.
- Can use **integrated assessments**, if demonstrates proficiency in each discipline assessed.

Initial Review of Draft Guidelines

Potential Cons

- Continued narrowing to **NCLB** subjects
- The **science curriculum & reporting can be narrowed** to only assessed objectives within each strand.
- **Alternative** has been effectively re-defined as “**anything other than the prior state SOL test**”, e.g. performance, authentic, and portfolios not required.
- School divisions can choose a “**specific test**”, which implies that multiple choice tests focused on lower-level learning, such as benchmark tests, are OK.
- **No PD** for teachers required

Lessons from the Nation & Virginia

- **Changing the Dynamics**
 - The VISTA Vision: High Quality Curriculum & Assessment
 - The Reality: Division and School-Level Barriers
- **Moving Forward: Changing the Reality**
 - 2014-2015: Small Steps
 - Building Upon VISTA
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What is VISTA?

- **Virginia Initiative for Science Teaching and Achievement (VISTA)**
- **\$28 million** dollar grant award to George Mason University over 5 years
- Major components: **elementary science (4-6)**, underprepared secondary teachers, statewide infrastructure, increased access for rural teachers, **research** on what enables students to learn

VISTA and Science, Grades 4-6

- **Objectives**

- Enhance the quality of elementary science by implementing inquiry-based teaching that is problem-based
- Increase student learning in science including students with special needs and LEP

- **Professional Development**

- Teams of 2-6 teachers
- Summer - 2 weeks PD & 2 weeks student camp
- School Term – implement problem-based unit, follow-up, classroom coaching
- Assessment – impact on teachers and students

News Article – VCU Camp

A thirst for science

BY JOHN RAMSEY

Richmond Times-Dispatch | Posted: Saturday, July 19, 2014 12:57 a

Moving education beyond textbooks

Kimberly Wilkerson held a jar of dirty, yellow pond water in front of 21 young students Friday morning and let loose a promise that made them gasp.

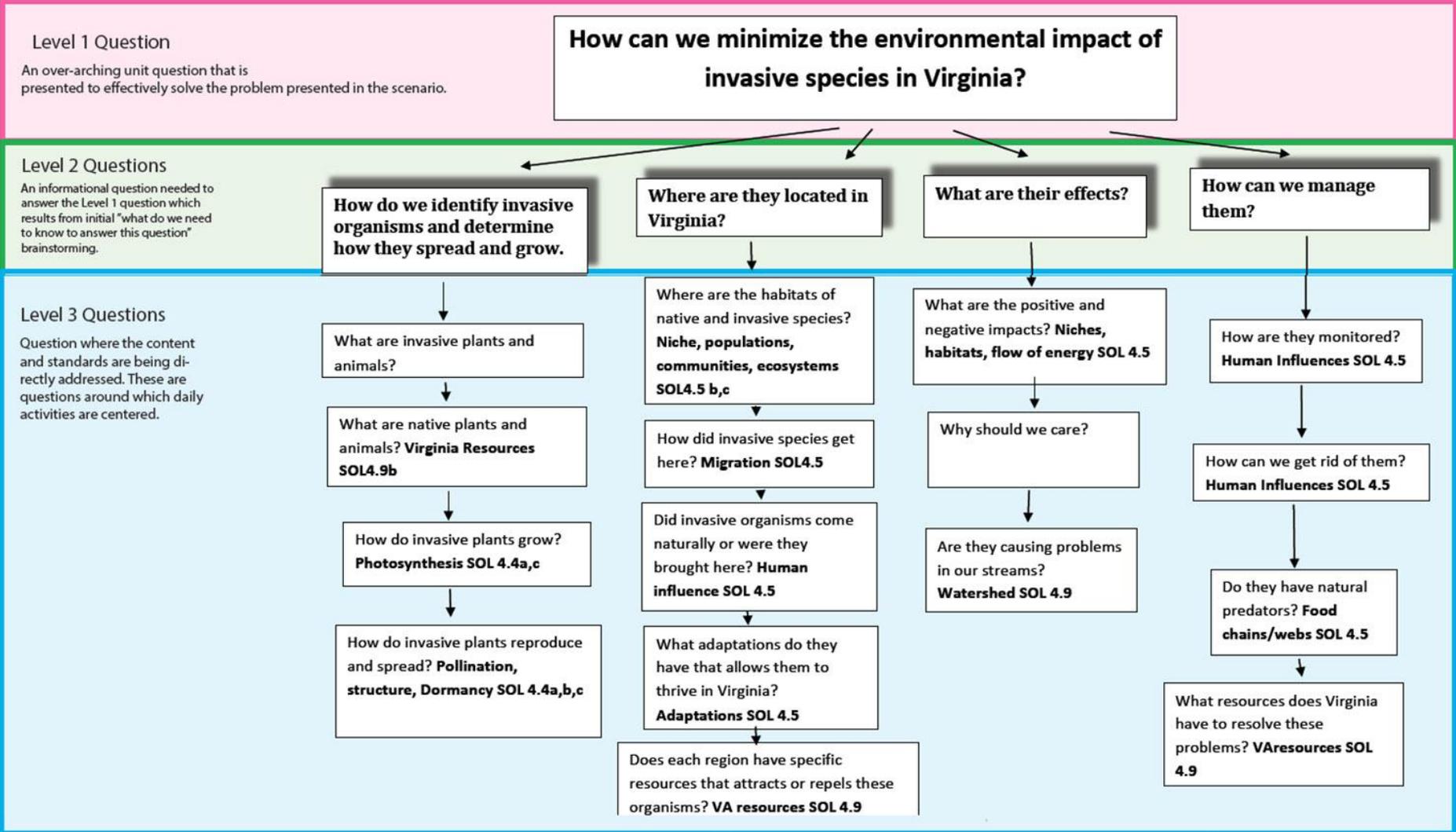
"Your job today is to come up with a way I can drink this water," Wilkerson said. "I'm going to drink this water by the end of the day, so you better come up with a good filter. OK?"



A thirst for science

Educator Megan Blunt led students through a water-filtering exercise at Virginia Commonwealth University last week. More than 30 Richmond-area teachers are participating in the Virginia Initiative for Science Teaching and Achievement, or VISTA.

INVASIVE SPECIES QUESTION MAP



Cumulative Activity

Students will use their research and experimental design data to develop a management plan that will educate the public on the control of invasive species in Virginia, and present their plans to a panel of local and regional experts.

Preliminary Findings

Teachers

- ✓ VISTA is improving teacher beliefs, confidence and knowledge
- ✓ PBL, Inquiry, NOS, Technology
- ✓ Classroom implementation – PBL, Inquiry

Students

- ✓ Non-statistically significant effect on all students
- ✓ Small positive effects on ELL and Special Education
- ✓ Statistically significant difference for economically disadvantaged students
- ✓ SOL Test

Implementation Research

Factors that Promote Uptake of Research Findings

- Teachers' acceptance and commitment to the program
- Feelings of professionalism and self-determination among teachers
- Programs are perceived by teachers as practical, useful, and beneficial to students
- “Unambiguous buy-in on the part of all staff at the school”
- Administrative support and leadership

Division and School Level Barriers

National Data . . . VA Anecdotes & Data

- Curriculum Narrowing: Reading, Mathematics & Test Preparation
- Much Curriculum Left Behind: Poor and Minority Schools . . . Widens Gap . . . Espoused and Enacted Curricula Don't Match
- Teachers lose opportunity to teach in ways that are compatible with their professional identity
- Narrowing is not supported by the public: value basic skills and ability to analyze and interpret information, apply ideas to new situations, think critically, and engage in problem-solving
- Broader curriculum is needed for a productive, strong, and nimble economy

Moving Forward: Changing the Reality

2014- 2015: Small Steps

- Requirement for Minimum of One Performance Based Assessments
- Simple: Modification of ESS Assessment
- Teams of Teachers
- Implement Second Semester

Use MSP & Other Funds to Leverage VISTA Model

- Development of High Quality Curricula – VISTA Model (K-6)
- Development of High Quality Assessments for VISTA type Units
- Longer-Term Funding

Support the Broadening of the Curriculum

- Flexible time for high quality science
- Address how time can be insured, given NCLB
- Matrix of assessment options