NGSS Guidance for TASC Professional Development Curriculum

Queensborough Public Library (Queens, NY)

DRAFT Version 1 – 6/1/2015

© 2015 Victory Productions, Inc.
CCSS Guidance for NYSED TASC Curriculum Development

Background

Victory Productions, Inc. is a state-of-the-art development organization that designs integrated learning experiences for multiple platforms, from standards and curriculum alignment to enhancing professional practice. Our work includes research-based professional learning, program evaluation, and strategic planning and consulting; curriculum development in all content areas; assessment (high-stakes, formative, technology-enhanced, performance-based, including the development of PARCC and SMARTER Balanced assessment content); translation and multi-lingual products; and a wealth of educational technology applications from games/simulations to apps. Founded in 1995, Victory is located in Worcester, Massachusetts with a wholly owned facility in Medellin, Colombia. Victory is proud to be certified as a MBE/WBE (minority/woman owned company).

Victory’s Professional Learning and Leadership team collaborates closely with organizations and schools to infuse what the research says about teaching, learning, and professional practice into systemic implementation. Our work infuses a professional learning perspective into the development and integration of content and instruction. Through this lens, we emphasize the deep reflection and transfer to practice that adult learners need in order to become more effective in their profession, specifically, pK-20 education. With national recognitions, our collective experience spans organizational and school district leadership, enhancing educator effectiveness and professional coaching, curriculum design, program implementation and evaluation, research and leadership in education reform, and extensive consulting.

Overview

For ease of use and consistency, this NGSS Guidance distills the key criteria from a variety of national Next Generation Science Standards support materials, including a draft of the EQUIP rubric for NGSS. This tool will serve as the primary evaluation framework to inform our review of TASC curriculum materials and guide our feedback to teams.

For more background, we encourage curriculum teams to study and reference the EQUIP Rubric to inform instructional planning, development, and revisions. The EQUIP (Educators Evaluating the Quality of Instructional Products) Rubric is a tool for evaluating, identifying, and informing the development of high-quality curriculum materials aligned to the Common Core State Standards (CCSS). The work was initially a collaborative effort of educational leaders from Massachusetts, New York, and Rhode Island, facilitated by Achieve, Inc. The EQUIP Rubric has now become widely used across at least 26 states to examine and assess the quality and CCSS-alignment of curriculum units and lesson plans by a consistent set of expectations. A draft version is available for NGSS-alignment.

Due to the tight project timeline and limited scope, we will not provide formal ratings on the EQUIP Rubric (unless requested). Instead, we incorporated the criteria into this NGSS Guidance document to ground project staff and consultants in a common language for evaluating and discussing the quality and NGSS-alignment of TASC curriculum units.

We welcome questions from teams. Please feel free to contact Ronit Carter, Director of Professional Learning & Leadership, at 508-798-6209 or ronit.carter@victoryprd.com

© 2015 Victory Productions, Inc.
The NGSS Emphasis

The Next Generation Science and Engineering Standards were based on the National Research Council’s Framework for K-12 Science Education. The standards, also known as performance expectations, integrate **three-dimensional learning** – an emphasis on a depth of learning in the fields of science and engineering which occurs through a combination of three dimensions: **Crosscutting Concepts, Disciplinary Core Ideas, and Science & Engineering Practices.**

### NGSS Three-Dimensional Learning

<table>
<thead>
<tr>
<th><strong>Crosscutting Concepts:</strong> Concepts that provide an organizational structure to interrelate knowledge and understanding from a variety of scientific fields into a coherent and a scientific view of the world.</th>
</tr>
</thead>
</table>
| • Patterns, Similarity, and Diversity  
• Cause and Effect  
• Scale, Proportion, and Quantity  
• Systems and System Models  
• Energy and Matter  
• Structure and Function  
• Stability and Change |

<table>
<thead>
<tr>
<th><strong>Disciplinary Core Ideas:</strong> Conceptual ideas that focus K-12 science curriculum, instruction, and assessment on the most important aspects of the discipline. These ideas have broad importance across multiple science or engineering disciplines or are central to a single discipline, serve as tools to understand or investigate more complex ideas and solve problems, relate to students’ interests and life experiences and/or connect to societal or personal concerns with scientific or technical background, and support teaching and learning across multiple grades at increasing levels of depth and sophistication.</th>
</tr>
</thead>
</table>
| • Physical Sciences  
• Life Sciences  
• Earth and Space Sciences  
• Engineering, Technology, and Applications of Science |

<table>
<thead>
<tr>
<th><strong>Science &amp; Engineering Practices:</strong> Behaviors which scientists engage in as they investigate, build models, and develop theories about the natural world; and which engineers use as they design and build models and systems. NGSS emphasizes engaging in scientific investigation, which requires not only skill, but also, knowledge specific to each “practice.” The combination of learning about content and engaging in practices develops deeper conceptual understanding.</th>
</tr>
</thead>
</table>
| • Asking questions (science) and defining problems (engineering)  
• Developing and using models  
• Planning and carrying out investigations  
• Analyzing and interpreting data  
• Using mathematics, information and computer technology, and computational thinking  
• Constructing explanations (science) and designing solutions (engineering)  
• Engaging in argument from evidence  
• Obtaining, evaluating, and communicating information |

© 2015 Victory Productions, Inc.
Alignment to the NGSS Standards

Alignment to NGSS emphasizes alignment to three key dimensions of learning expectations (i.e., standards), which must work together in order to build conceptual understanding – Crosscutting Concepts, Disciplinary Core Ideas, and Science & Engineering Practices.

**Content and Practices Work together to Build Understanding: 3 – Dimensional Learning**

- To form useable understanding, knowing and doing cannot be separated
- Scientific ideas are best learned when students engage in practices
- Allows for problem-solving, decisions making, explaining real-world phenomena, and integrating new ideas

© 2015 Victory Productions, Inc.

---

**CCSS NGSS Alignment**

1. Curriculum (unit or lessons) provides grade-appropriate opportunities to make sense of concepts and/or design solutions to problems, by engaging students in a combination of:
   - Specific NGSS Practice Standards
   - Specific Disciplinary Core Ideas
   - Specific Crosscutting concepts

For longer units or collections of lessons, the following criteria should also be evident:

2. Lessons fit together coherently by (a) linking content to prior lesson and (b) collectively working together to target proficiency on a specific set of standards (i.e., performance expectations).

3. Where appropriate, Disciplinary Core Ideas from different disciplines are incorporated to help explain various scientific/engineering concepts.

4. Where appropriate, Crosscutting Concepts help to explain concepts from different disciplines.

5. Integrates grade-appropriate connections to the CCSS Mathematics standards and CCSS ELA & Literacy Standards for History/Social Studies, Science, and Technical Subjects.
Assessment

Principles of effective assessment, including alignment to types and uses of assessment to fit the intended learning goals, are in effect for NGSS-aligned units/lessons.

Units/lessons regularly assess students’ mastery of standards-based content and skills, by:

• Eliciting direct, observable evidence of the degree to which students independently demonstrate proficiency in targeted grade-level NGSS standards by engaging in a combination of NGSS Practices, Crosscutting Concepts, and Disciplinary Core Ideas.

• Embedding formative assessment throughout curriculum lessons/units in all 3 areas (NGSS Practices, Crosscutting Concepts, and Disciplinary Core Ideas).

• Including aligned rubrics or scoring guidelines that provide sufficient guidance for interpreting student performance.

• Assessing student proficiency with accessible and unbiased methods (i.e., examples, visual and other representations, vocabulary).

• Overall, the curriculum includes various modes of curriculum-embedded assessments (including, but not limited to, formative, summative, and self-assessments).

A Range of Instructional Supports

Consistent with the NGSS emphasis on equity, accessibility, and opportunity to increase depth of learning for a wider range of students, a variety of instructional supports should be woven throughout all curriculum units/lessons. Samples are highlighted below.

• Connects the 3 dimensions of NGSS – Crosscutting Concepts, Disciplinary Core Ideas, and NGSS Science and Engineering Practices; and develops deeper understanding of these 3 dimensions by building on students’ prior knowledge.

• Engages students in authentic and meaningful scenarios that have a purpose and reflect real-world applications of the fields of science and engineering.

• Connects students’ personal experiences to their work in designing solutions to problems and explaining scientific concepts/phenomena.

• Instruction supports diverse cultural and linguistic backgrounds, interests, learning styles, proficiency levels, and background knowledge.

• A mix of instructional approaches include, but are not limited to, physical and visual models, and representations, questioning strategies, checking for understanding, discovery, etc.

• Integrates technology and media as appropriate to deepen learning and highlight conceptual or text-based features, and to engage learners in a variety of ways.

• Supports are gradually removed, to promote students’ increasing ability to demonstrate proficiency independently.