NGSS and CCSSM in Action

Educator plans and analyzes a lesson that relates to a conceptual category of the Next Generation Science Standards (NGSS) or the Common Core State Standards for Mathematics (CCSSM) to improve professional practice and student learning outcomes.

Key Method

The educator selects a conceptual category of the NGSS or CCSSM that they wish to explore in greater depth and analyzes the standards in that category. The educator devises a set of criteria for measuring progress on the standards in an NGSS or CCSSM conceptual category appropriate to their grade level, designs a series of lessons addressing the standards to be measured, teaches the lessons, and analyzes student performance using the measure created.

Method Components

Many aspects of CCSSM and NGSS may be new to secondary educators. In this micro-credential, you will identify an area from a list of suggestions below to investigate within one of the standards. You will engage in readings about that content using the identified resources to deepen your knowledge of the content area and plan, implement, and study a lesson related to that content with your students.

Components of Standards Analysis

- Analyze the content of a set of related mathematics and science standards
- Identify aspects of student performance that would indicate the standard has been met
- Identify and analyze mathematics/science tasks that have the potential to support student learning related to the set of standards
- Design lessons that support student learning opportunities related to the standards under study
- Create a measurement tool (rubric, standards-based grading criteria) that captures student performance related to the standards
- Analyze student performance related to the standards after students engage in the target lessons

Suggested Implementation

1. Discuss the dimensions of CCSSM and NGSS and the instructional shifts represented by the documents
2. Select a conceptual category or cluster of standards that you will teach soon in one of your classes and would like to learn more about
3. Read and analyze the set of standards and associated resources provided by the facilitation team
4. Identify and analyze math/science tasks related to the set of standards
5. Design a measurement tool to assess student progress toward the standards
6. Design lessons to be taught addressing those standards
7. Teach the lesson and analyze student performance (action research)
Supporting Research

Mathematics


Science


Resources

Learning Opportunities

- **Session 1 (F2F) [17 November]:**
  Begin with a KWL chart related to the standards. Discuss Facts, Myths, and Don’t Knows about CCSSM and NGSS. Specifically, examine the assumptions and design frameworks of both sets of standards using print and online resources (list of resources below).

  Identify a conceptual category or set of topics (see Table 1 below for suggestions) that relates to content that you will soon be teaching. Read the standards and associated literature and analyze the standards: what does this set of standards suggest that students should know and do, and how does that knowledge inform our instructional design and decisions? How does the “big picture” of a unit change when considering planning with CCSSM or NGSS?

- **Session 2 (Online PLC):**
  Identify tasks related to the mathematics or science cluster of standards that is your focus, using the provided online resources and other curricular resources. Analyze these tasks with respect to the extent to which they embody the standards.

  Read about ways to categorize math (cognitive demand) and science tasks.

- **Session 3 (F2F) [3 December]:**
  Using the tasks identified in Session 2, use a research-based analytical framework to categorize tasks and identify strong candidates for classroom implementation. Work in small groups to plan for lessons using the tasks, including anticipating student thinking, identifying purposeful questions to ask, and considering ways to promote student engagement and productive struggle. Tailor existing MPS rubrics to measure outcomes related to the target standards. Share overviews of math and science standards and potential lessons across the group to better understand the other content area.

- **Session 4 (On the Job Transfer):**
  Teach the lesson(s) planned and collect data on student learning. Reflect on the ways in which the critical features of the standards (math: focus, coherence, and rigor; science: crosscutting concepts) are embodied in the lesson that was taught and the data that was collected.

<table>
<thead>
<tr>
<th>Mathematics (CCSSM)</th>
<th>Science (NGSS)</th>
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</thead>
<tbody>
<tr>
<td>S-ID.6-9 (recommended for Algebra I)</td>
<td>HS Physical and Life Science Standards—depends</td>
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<tr>
<td></td>
<td>on individual teacher’s specific content areas</td>
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<tr>
<td>G-SRT.A and G-SRT.B</td>
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<tr>
<td>(recommended for Geometry)</td>
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<tr>
<td>G-C, G-GPE.1 (recommended for Geometry)</td>
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<tr>
<td>S-IC (recommended for Algebra II and</td>
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<td>beyond)</td>
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*Note: The “Learning Opportunities” are from the Milwaukee Master Teaching Program. If you would like to take advantage of that learning opportunity and are not part of the program, please check back later on this micro-credential for video recordings of the sessions.

Submission Guidelines & Evaluation Criteria

Except where otherwise noted, this work is licensed under:
http://creativecommons.org/licenses/by-nc-nd/4.0/
To earn the micro-credential, you must receive a passing evaluation for Part 1, 3, and 4 and a “Yes” for each artifact submitted for Part 2.

**Part 1. Overview Questions**
Response may be written or provided through a video.

- Describe what you learned about the content standard that you studied.
  - **Passing:** Educator includes detailed and accurate descriptions of the mathematics and science content. The response makes meaningful connections to pedagogical implications and how the content fits into the curriculum and course at play.

**Part 2. Work Examples/Artifacts**
To earn this micro-credential, please submit the following two artifacts:

- Your lesson plan and a brief narrative about how the lesson plan addresses the standards that you focused on.
  - Be sure to describe how your lesson plan makes use of a meaningful task for students using the key instructional shifts for your domain (Math: focus, coherence, rigor; Science: engagement, NGSS 3 dimensions, Inquiry—5 E’s model)

- Student learning artifacts collected from classroom practice, analyzed using the tailored math/science rubrics

<table>
<thead>
<tr>
<th>“Yes”</th>
<th>“Almost”</th>
<th>“Not Yet”</th>
</tr>
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<tbody>
<tr>
<td>Lesson plan includes a meaningful/high-cognitive-demand task in mathematics or science that is clearly aligned to the standards. The narrative describes connections between the specific standards under study and the lesson plan. The lesson plan includes clear formative assessment tools designed to support data collection.</td>
<td>Lesson plan includes a meaningful/high-cognitive-demand task in mathematics or science with some alignment to the standards. The narrative describes connections between the standards under study and the lesson plan. The lesson plan includes some information on formative assessment tools designed to support data collection.</td>
<td>Lesson plan does not include a meaningful/high-cognitive-demand task and/or does not include information on formative assessment tools designed to support data collection.</td>
</tr>
<tr>
<td>Artifact includes student learning data from at least two different sources. Educator used the rubric that was developed to analyze student data and draw conclusions about what they learned or did not learn related to the target set of standards. The relationships between the rubric indicators and the standards are clearly articulated.</td>
<td>Artifact includes student learning data from a single student. Educator used the rubric that was developed to analyze student data and draw conclusions about what they learned or did not learn related to the target set of standards. The relationships between the rubric indicators and the standards are in need of clarification.</td>
<td>Artifact does not include student learning data or only contains a narrative description of what happened. No rubric is included.</td>
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**Part 3. Student Reflection**
Ask at least 15 students to reflect on their experience as a learner in this lesson or series of lessons.Aggregate their responses in a narrative summary and include it here.
- **Passing**: A range of student perspectives is represented. Student feedback includes explicit attention to mathematics/science content addressed.

Part 4. Educator Reflection
Reflect on the effectiveness of the lesson from your perspective as an educator.

- **Passing**: Reflection makes connections between actions taken as an educator and student learning as represented in the action research analysis for Part 2. The reflection includes explicit attention to mathematics/science content addressed and clearly identifies areas of strength and areas for future improvement.