

Preparing for the Next Generation Science Standards Through a K-16 Collaboration: Insight from District Administrators

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The Next Generation Science Standards (NGSS) are now available for all states to consider. New Jersey is presently considering adoption and eight states have already done so. Given the involvement of many NJ science education leaders in early reviews of NGSS drafts, it is anticipated that principles from the NGSS will heavily influence the next revision of the NJ Science CCCS scheduled for 2014, should the state choose not to adopt the NGSS. So districts will need to adjust. Implementation of either set of standards is not expected to begin before the 2015-2016 school year, thus districts have the opportunity to carefully plan for the significant science program transformations expected for all districts (NSTA 2013). We share here a K-16 project designed to help several districts do so collaboratively.

The NGSS and its precursor, A Framework for K-12 Science Education, provide coherent guides to expectations for K-12 science education that is more coherent and detailed than the current NJ science standards. If implemented appropriately, they will likely impact every aspect of a K-12 science program. Curriculum revisions that come from successful implementation will require notably more time and consideration than in the past. All levels of district leadership and all teachers of science will need significant support to revise and effectively implement their science program. Compounding the challenge right now, but perhaps also offering the potential to help with implementation, if handled wisely, is the newly implemented

teacher evaluation programs mandated by the TEACHNJ Act. The learning expectations in the NGSS conform to some of the expectations of the new teacher evaluation programs, particularly to earn a level 4 in some areas (promote a student centered learning environment, deepen student learning, etc.). Thus, fully implementing the standards can help teachers earn high ratings.

Rider University's Science Education and Literacy Center (SELECT), in partnership with Princeton University's Teacher Preparation Program and the Science Education Institute at Raritan Valley Community College, has begun helping 13 NJ districts conduct a gap

analysis of their K-12 science programs regarding the effective implementation of the NGSS. Using NGSS resources available through Achieve (www.nextgenscience.org), the National Academy of Science (www.nap.edu), the National Science Teachers Association (ngss.nsta.org), and key principles of gap analyses, a six-day program was designed for district administrators and teachers to guide them through an analysis of their present science programs. This extended study will help districts look in a mirror long enough to develop a detailed view of where they stand and what they will need to consider for implementation. Funding for this projects was generously provided by the Bristol Myers-Squibb Corporation.



District teams (Table 1) have reviewed

- Integrated dimensions of the Framework and NGSS: Science and Engineering Practices; Crosscutting Concepts; the Nature of Science; Disciplinary Core Ideas (DCIs) in Science & Engineering*
- NGSS Student Performance Expectations*
- Aspects of science programs to

identify gaps in alignment (e.g. curriculum; instruction; assessment; professional development; new teacher qualifications; budget; community & communication)*

- Districts' present curriculum and instruction with selected teachers during four separate grade band reviews (K-2; 3-5; 6-8; 9-12) of the NGSS**

Preliminary Insights

We designed the two-days in July for teams of administrators to consider pooling their wisdom and experience to uncover major insights about what a future with the new standards could mean. And indeed they did! Some of their insights regarding the components of the NGSS include:

* We addressed the first three bulleted components during a two-day session for administrators in July 2013. Teams of two administrators (science supervisors, principals, and/or assistant superintendents) considered the degree to which aspects of their present science programs address the Framework dimensions and NGSS performance expectations. They identified gaps in their program and determined what additional research would be needed to clarify and refine their preliminary findings. With draft gaps identified, they began drafting an action plan.

** Since instructional resources and district curriculum typically drive what actually takes place in classrooms, four separate grade band sessions were designed to dive deeper into these areas to reveal any unique circumstances for each grade or grade band. In each day-long sessions, two teachers from each grade band (K-2, 3-5, 6-8, HS) are guided to analyze district materials looking for alignment (or lack of alignment) with the NGSS through a grade level focused introduction to the Framework and NGSS. These sessions were designed based on outcomes from the summer administrator session. Teachers and district administrators work together to gain additional insight about the impacts of the NGSS on their science program through the eyes and minds of classroom practitioners. The four sessions afford the teams the opportunity to further refine their analyses and action plans begun in July. K-5 teachers have contributed thus far, and 6-12 teachers will join the effort in spring 2014. After completing all components of the program, district teams should be in a position to use their complete gap analysis and action plan to implement the standards.

- *Crosscutting concepts*: not addressed and/or made explicit in current science programs.
- *Science practices and nature of science*: most are not explicitly addressed; engaging students in the Practices will require a shift in district science program culture, assessment efforts, and teacher content knowledge; expectation that students ask testable questions and define problems is a significant change;.
- *Science DCIs*: found notable redundancies of topics through the grades, more content than the NGSS address, and content at inappropriate grade levels; earth science is missing from grades 9-12.
- *Engineering DCIs*: missing in K-12; request help identifying appropriate lesson opportunities; existing lessons typically define the problem and are not tied to grade level appropriate science &/or math content; expectations are higher for the complexity of high school problems; “design failure” is not currently addressed.
- *Reactions to NGSS*: for curriculum revisions, clarification statements and links to Common Core will be helpful; coherent design of three dimensions of NGSS will be very useful in curriculum design, but everyone should get proper support to understand details and intended coherence.
- *Likely biggest impacts*: higher expectations for sophistication of content addressed at many grade levels; curricula will need much realignment.
- *Summary insights*: we are being asked to fundamentally change teaching at a very challenging moment; districts will need sustained and comprehensive efforts to implement new standards; parents need to be informed and involved; assistance will be needed to create/revise lessons and select new resources.

From their work thus far, administrators reported that they are better prepared to plan short-term and long-term strategies and involve



others. District draft gap analyses show an emphasis on developing communication plans to inform all administrators and parents; planning for actions that require funds to implement; engaging district teams to develop internal expertise for curriculum and assessment alignments needed; and planning PD that teachers will need. Details are yet to be determined. Such a mid-program outcome

illustrates the scope of work needed to simply plan for implementation. Participants in the program found value in collaborating with other districts; and program guidance, materials and time reserved for this work. They noted that the emphasis on student learning, the big picture view of the NGSS, and the combined expertise of the leadership team and colleagues were additional strengths.

Table 1. Districts participating in the NGSS Gap Analysis Project.

Rider SELECT's NGSS Gap Analysis Project Districts
Chesterfield Township School District
Ewing Township Public Schools
Flemington-Raritan Regional School District
Hamilton Township School District
Hillsborough Township Public Schools
Hopewell Valley Regional School District
Mansfield Township School District
Montgomery Township Schools
The Newgrange School
Northern Burlington County Regional School District
North Hanover Township Schools
Springfield Township School District
West Windsor-Plainsboro Regional School District



Additional support will be provided to administrators to refine their gap analyses and action plans. Since the gap analysis process is functioning as a “needs” assessment, district representatives are identifying the professional development they will need to implement the NGSS, and we are able to quickly respond. We recommend that every district undergo a systematic analysis of their science program to prepare for the NGSS. Resources created for our approach are available upon request.

Districts interested in participating in the second cohort of this project generously funded again by Bristol Myers-Squibb Corporation and beginning this July and continuing through the 2014–2015 school year should contact Cathlene Leary-Elderkin at clearyelder@rider.edu for more information about the application process.

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