

SCDN March 3 & 4, 2016

Next Generation Science Standards (NGSS): A Foundation - Okhee Lee, NYU Professor and member of the NGSS Writing Team

'1996 was the last update...Quite possibly a little bit has changed in Science and Technology since then...'

Overview - Writing team of over forty members in all roles; standards released in April '13; 18 states and DC have adopted standards as is (other states have adapted to fit their needs - - - this is where NY fits in, NY will not be an NGSS state because changes to NGSS were made). Standards were based on a variety of documents including *Science for All Americans*, *Ready, Set, Science!*, and the [Framework for K12 Science Standards](#) (a must read - Fred E.).

- Structure of NGSS builds in three dimensions: Science and Engineering Practices (SEPs) (these are the practices of doing sci/eng), Crosscutting Concepts (CCCs) (these connect the various branches of science), Disciplinary Core Ideas (DCIs) (these are the nuggets of content).
- Here is the link to the standards on the web: <http://nextgenscience.org/>
- Science is interconnected.
- Standards are not curriculum.
- Concepts build coherently; banded.
- Science and engineering practices must be integrated. Content is focused on preparing

NGSS

Science is different from CC in that there are many appendices.

These standards are not about content but about the way we teach science.

NGSS Instructional Shifts

Focus on explaining phenomena or design solutions to problems (Why)

Three-dimensional learning

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What phenomena would you consider using to teach the NGSS performance expectation (PE) to first grade students? The phenomena need to be:

- Student-centered based on prior experience or knowledge
- In the context of home community
- Generative over a period of instruction.

We then did an activity which demonstrated the shift in instruction. It required us to use a model and follow a progression of understanding.

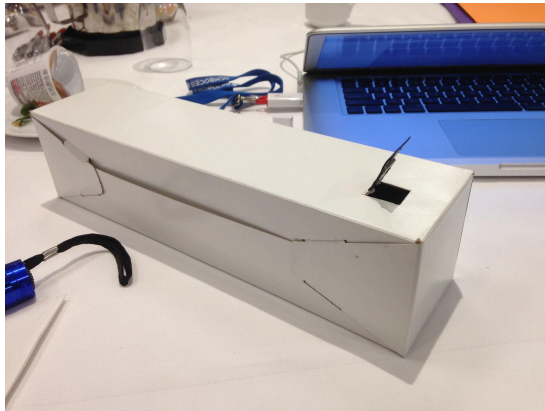
Questions give to us: How do you see an object? Can you see an object in the dark?

When we say a model in the science standards - We mean a conceptual model. Models should - show relationships, explain phenomena, specify cause and effect, used to make predictions. (it is more than a physical object) If it wasn't the model, it would be the real thing. Therefore, models are not perfect but our best representation of a phenomena .

In the model exercise that we needed to explain our ideas and think about what we were doing. From initial model, revised model and then best model that is understood at that time. This is how we do science.

You can draw, do labels and you can explain in writing.

This activity was made for us (setup). To make it more open the students do the investigation. We were asked to look into the box with the flap closed (nothing), with it open and then with a light being shone through the flap. We then had to draw a model for the phenomena.



Students need to be doing the work/thinking.

Demographics in a Nutshell

Majority of US students are in poverty (NYT, January 16, 2013) - Free and Reduced lunch for the majority of US students.

US school enrollment hits majority-minority milestone in Fall of 2015, Education Week, Feb. 1, 2015

Disability - 13% students receive special education services in 2012-2013

English language - 21% of students speak a language other than English at home in 2011.

9% of students participating in ELL programs 2012-2013

Teaching STEM for diversity is teaching STEM for all.

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<http://nstacomunities.org/blog/2015/05/20/ngss-for-all-students/>

Link to another Lee [presentation](#) about diversity and science. [Here's a blog post](#). Another detailed presentation can be found [here](#).

Okhee's case study book can be found here:

https://www.nsta.org/store/product_detail.aspx?id=10.2505/9781938946295.

7 Case Studies have been developed - All written by Teachers

There is a specific ELL Case Study: *Is All Soil the Same?*

Starts with soils of the world through the families of Ss (grandmother from Laos and soil for rice) [Home/Culture Connection] and leads to inquiry around soils in the district or area. Ss go out and look at the different soils.

My note: This could also lead to a global project (Alan November) in which you could connect with others classrooms around the world.

Evidence and Support - ELA CC skills.

Integration of Social Studies, ELA and Science.

Second grade social studies is My Community and Other Communities.

Science and Language - Creators of NGSS and ELA got together to look at the following:

Raise the bar for content (academically rigorous - explaining for a model)

Raise the bar for Language

You have to draw. You have to present. You have to speak. Language is the glue.

Understanding Language [site](#). [video](#).

Commonalities [diagram](#) among science, math, and ela.

Diagram - Commonalities Among the Practices in Science, Mathematics and ELA

Figuratively classrooms should be noisy - students are doing the work.
Reasoning and communicating is what matters in the modern classroom.

(California Research Site) Helen Quinn
Language Use in the Science Classroom

Talked about the garbage systems

I joined the elementary level group with Laura Lehtonen from Capital Region Boces
A chance to go a deeper into the science.
NSTA has some great resources. Laura attended a three day train the trainer conference.

Reporting out from the three different sessions.
Modeling - How do we define modeling in the different disciplines? It is similar to that of math in which students are given the opportunity to (see above).
Physical model is part of a model - this also includes graphical and conceptual.
With older students - it is an inexact representation.

There is an overlap into the other area but we don't know exact

Across the disciplines:
Argue from evidence is the crux of the three subject area. ELA says that K-5 students are doing the opinion writing but they are capable of doing argument writing. Science doesn't work from opinion writing. Standards are written by the content area experts.

Do the new standards offer us more clarity? It has everything to do with the curricula we are building off the standards.

Needs that we are going to have:
Teachers and administrators need to be trained in the way of inquiry based learning or experiential learning.
We need to empower our teachers to be able to experiment and try this. What if we brought together 5 or 6 teachers who collaborate for a period of time to develop a unit that incorporates these lessons.
This is going to require collaboration.
Be deliberate about our plans for changing standards (process instead of content).

Will Jacks & Ann Crotty - Science Associates for SED

Modeling all end up being the same thing. They simplify something.
If we really want to measure their learning that is happening in the classroom, then we need to change the assessments.

Survey Results - 2666 people answered the first questions and then the responses went down. 1,500 or so rated one the criterion. 1352 respondents completed the survey.

Science group came in and looked at the data and left their feedback with SED. Will did not have information to share from the feedback. Did not see negative feedback.

Ann - Important for us to look at gender in our science education. Look at all of our students and meet their needs. She works mostly through Title II B to enhance math and science education in NYS.

Your school districts who are seeing success with PD have strong relationships with higher ed., business and community partners and with their PD providers.

Leadership Support for the Science Transition - Helen Pashley, Author and Consultant
Vice President of STANYS
Currently working on next generation curriculum.

Rationale

Districts and NYSSLS

Gave us a resources for packet - both video and print.

There is a wide range of knowledge about the science standards.

Slides presented might start to frame our conversation with administrators and teachers.

What is our message:

- How can we best lead/support our district leaders? How do we give them the experiences?
- Illinois, CA, RI and 18 other states have adopted NGSS. Their work can be broken into awareness, transition (moving beyond the standards to practices) and then implementations (how do we develop lessons. Having really in-depth training.
- Unless teachers understand **why** they need to teach differently this is not going to go well.
- We will probably need a three year roll out once the standards are adopted.
- Look at CA
- Will be attending Brett Moudling training with STANYS this weekend. He has said it is a good thing that NYS didn't lead out of the gate. *(See notes from Moulding session below)*
- Identify and train workshop leaders - These are people who have really done some heavy lifting as far as understanding.

Leaders don't need to know everything about the standards but they need to understand the shifts.

Communicate the relevance of science to everyone's lives (biotech, nanotech, high tech industry). People who use the language of science as part of their jobs everyday. This is something the BOE and parents need to know.

What about CC? - Integrated into the bottom section of the standards.

The biggest change in science in 20 years will need PD to change in what is in people's minds and hearts.

What are other people doing? There is starting to be some quality curricular out there.

You can provide a packet of resources - Here is a [link](#) to the resources Dr. Pashley provided us.

Unpack/awareness of NYSSLS

History of the Development of the Standards (important to share).

Why is science as a discipline important?

Concept of science that is not just content.

Action Plan:

Build an K-12 Articulation team - have a team that can actually talk about these things.

Map your practices and not just your content.

Identify your expertise (who are your master teachers)

Understand successful implementation must result in change in the classroom.

Realize that most teachers have never taught 3D way

Problem-based learning, explain phenomenon

Address the needs of all students

Metacognition (teachers and students) - Do we give teachers and students the opportunity to reflect on how they are learning.

Follow Up:

Talk about progressions in practices

Build a coherent program- not just content

Make connections to ELA, Math, SS, Engineering

Have teams develop courses and curriculum lessons.

Concerns on Building Level:

How do I get teacher buy in? - Talk about the history based on NST standards and over the course of three years that have been a lot of input in developing the standards.

How do I respond to "I do this already?"

What does a great science lesson look like?

How can scheduling lecture/lab help with the new NYSSLS expectations?

How do I involve me ENL/ELL, special education teacher and specialist in meeting the needs of all students in science?

What should I communicate to parents?

Actions:

Survey what your teachers already know about NGSS

Honor what your teachers already know - may be what your great teachers do now

Squashes students "Why do we have to know this?"

Just try it and see, student engagement

Not about you, about the students.

Concerns at individual levels - HS

I have so much to cover. I don't have time for students to investigate.

I have to start from scratch each year and teach them graphing.

What will the assessments look like?

When will NYSSLS be implemented, and how quickly?

Will there still be lab time?

Do I have to teach engineering?

What is different from what I do now?

How do we move ahead? HS Actions:

Discuss and focus on the important ideas

Imbed "scientific method" throughout the year

Department or team discussion/rewrite of 1 unit (choose compatible with current standards). For example the MS unit on cells. Nothing that they are doing in that unit that is going to hurt kids on the 8th grade science test.

Share best practices - If you are giving exit tickets, what do you do with them?

Consider rewriting some of your assessments

Discover what others are doing - Professional organizations (STANYS, NSTA, Listservs, #NGSSCHAT)

Demonstration how to use formative assessments wisely. (If you give exit tickets, how do you use them?)

Collaborate with other departments/buildings

Writes assessments based on PE's

Reassure - Don't have to teach shop. Explore examples of engineering integrated into course.

Concerns MS:

6th grade teachers need a lot of science support.

What topics will be taught at what grades?

Certification - NYSED

Acceleration?

Course development and options

Actions MS:

Discuss and plan course development

Take advantage of new expectations
Build on existing teams
Content support
Share best practices
Embrace having a little more time to have fun with this.

Concerns at Elementary Level:

I don't have time. When am I going to do this?
Do I have to give up the unit I always teach on butterflies?
My K students can't plan and carry out an investigation. Do I have to teach them the scientific method?
I don't like sciences.
What if I don't know the answer?
I don't know anything about waves.

Actions -

District leaders must set expectations for science time
Observe a science lesson
Provide opportunities for teachers to become science and engineering learners
Content workshop and support
Demonstrate what investigations look like at K,3,5 level. Match to progressions
Book study - Wynne Harlan

A great science lesson:

Allow students experience science as part of their lives.
Like a great chef - must adjust as you go along.

What's already out there?

Forum for district sharing
Explore what other states are doing - CA
Resources - Books and websites
EQulP rubric

Take home message

Quality presenters have experience of NGSS?NYSSLS
Important work and WILL take time

Awareness/introduction to NYSSLS

Computer-Based Testing - Jennifer Sattlem, Regent Fellow SED

NYSAA - March 4th is the lockdown date for data in KITE. Training needs to be completed before the date the teacher is to administer the exam (not March 4th). Complete this training a few days prior to the exam.

Duplicate rosters - if a student is on more than one roster then testlet will not be generated.

District to district (need to come off) Same school and two ELA rosters the testlet will not be generated.

3-8

Positive feedback from the training and those materials are online. Will be launching a CBT support site next week.

Release the questions sample a couple of weeks ago. Couple of know issues in the questions sampler. Horizontal scroll bar is not acceptable and will be changes. Constructed response box will be larger (more than 4 lines of text) for the field test.

Preview administration site - Districts who have said they would participate in field test a login to the system. It will be open for three or four weeks. Nextera (sp?) is the equivalent of KITE for NYSAA.

March - secure browser check. Information provided in the January training.

April - All of the participating data will be uploaded to the system. You will need to go into the administration site and make sure the the classes are assigned to the right teachers.

May 23, 2016 the field test window will open. Maximum flexibility is given in the administration. The whole grade doesn't have to be administered at the same time.

Anticipate the possibility of problems. This is a much larger group of students testing than NYSAA.

If you volunteered for CBT in the field test, even if your district was not selected you will still be able to try out the system.

Next year - District and schools will be able to make the decision by grade level. If you select a grade level, both ELA and Math for that grade level. 5 Day CBT window next year currently - hope to be able to provide more flexibility.

Contract with Questar - If a test is given on computer, it will be scored on a computer based platform. Scoring cost is provided as part of the contract with NYS and districts would not have to pay.

Commissioner would like to see all 3-8 testing on Computer by 2020

Updates and an Introduction - Jhone Ebert, Senior Deputy for P-12, SED

from Clark County School District with 8000 square miles. Schools from rural with 11 to Las Vegas from 4000. Went from 120,000 to 320,000 students.

Knows Elia and was asked to come to NY.

Best Practices

Need to make sure that our standards are fluid

CC standards are 5 years old so it is time to look at them as it is best practice.

ELA - Developmentally appropriate in the early years. Need your expertise to come forward and lead in certain areas.

Those people who want to sit on the standards review community - Link will be available next week. Need leadership. SED has provided a lists of review groups.

Review and Implementation Timeline

The curriculum is at the local level.

Blueprint for Improved Results for Students with Disabilities - Joanne LaCrosse, Supervisor, Policy Development, Special Education, SED

Blueprint has seven core principles. Each based upon research.

Good tool for district to use.

Will morph over time.

All teachers are teachers of students with disabilities. Every teacher needs to be skilled in teaching students with disabilities.

It is important to hold students with disabilities to high expectation and that they are given the support to success.

SED is in the process of developing self-review tool for self-advocacy. For example - Over the age of 15 students need to be invited to their IEP meeting.

Data from NYS - Pre-school system has 30% of special education students are separated from their peers. K-12 - 20% of special education students are spending apart from their peers at least part of the day.

Inclusion is not just about sitting in the general education classroom.

- <http://www.p12.nysed.gov/specialed/commoncore/guidance-commoncore-template.htm>

100 hour Certification Requirement and Certified Providers - Ann Jasinski, Assistant Director, Office of Teaching Initiatives

Yet to go to the BOR with the draft regulation. Have gone to the union and the School Boards Association.

Have not gotten a final decision on approved providers. If it goes to the March meeting it will be in effect by March 26

Proposed If you are a BOCES, teacher center, union or district there will not be a charge as a provider.

Expedited process for being an approved provider. Hopefully through the teach system. You will be saying that your group is going to meet the PD Standards.

Those that are not exempt will need to pay a \$600 fee. Associations like state Math and Science Teachers Associations will need to register and pay the fee.

Every provider will need to reapply every 5 years.

There has not been a decision made about consultants.

PD plans will remain. Maybe some language changes around the 100 hours.

ENL Waiver - 15 percent for ELL teacher and 50% for ESELs - If a district has a waiver then the teachers in that district have the waiver as well.

No PD requirement if you don't work more than 90 days for any district within a state. Teacher's obligation to know if they have met that 90 days.

CTLE - There is an enforcement of the 100 hours. In the future it will be both certification and registration.

Will notify people when their month of birth is coming up that they need to be registered in teach. Contact will be the email addresses in teach. SED is not mailing notices out. Will work with other organizations to get the word out. Come to July 1, 2017 everyone has to be registered

Everyone needs to be in by July 1, 2017. They will start when they get registered. They will know when their renewal date and will be based on when registration date.

Teacher is responsible for retaining all documentation related to their CTLE.

DS Update - Bill Hecht, District Superintendent Orange-Ulster BOCES; Jeff Matteson, District Superintendent, TST BOCES

Having good discussions with SED.

RTI - Need to use multiple measures. Need to be do a better job identifying students.

Shift in emphasis at SED in that when you give input be careful because you might get it. SED is open to the ideas that work closest to the field. How to create guidance that offers more flexibility at the local level.

Need to build the public trust in our education system.

State assessments are part of the program a larger program. We have to get back to this conversation. None of us will win a defense of standardized assessments. Moving into the natural assessment creating process.

Standards & Assessments Updates - Mary Cahill

Moving forward with Science Standards

Art Standards - Posted a call for art educators to be part of the standards teams (posted March 3, 2016).

Revised Standards to the BOR by Nov./Dec. 2016

Beginning January 2017 Curriculum Revisions

Summer 2017 - Start PD around the revised standards

3-8 - First year of Revised ELA and Math assessments by 2018-2019 school year.

Increased number of educators involved in assessments.

Questar is playing the role of facilitator instead of author. Educators will be involved test. Educators shifted through the test bank to select the questions for this year test. These questions were written by Pearson two years ago and field tested last year. Next year's questions will be most Pearson as well but educators will shortly be called to Albany to heavily edit. The 2018 test will be the first test since NCLB that are fully developed by educators.

Releasing a memo today on the timing of the test. In talking to other states who have done this, it has been a very positive things. Most of the guidance will be left up to local districts. Administration Manuals will be there as well.

New instructional reports coming out sooner than ever. RICs will get the information they need with 5 days of the administration. Should have five common reports in the hands of teachers by the end of the year. More specific information will be coming soon.

New individual parent reports are in draft format. Looking for feedback.

Releasing at least 60% of items (possibly more) Will release all of the CRs for ELA and possibly all of the math. This will happen earlier than in the past.

Stand Alone field test - At least 25% less stand alone field tests.

Regents - Regents Exam Workgroup since September
Recommended the additional Algebra exams.

Standard setting will be done this summer. Educators are needed to come in and tell them where the cuts needed to be. The cut related to mastery will be in the hands of those educators.

Doing a lot of work with Social Studies - All educator developed tests.

Computer-Base testing is the future. 2020 will all students that can be test by computer. Innovative items, faster turnaround time.

Pathway Assessments - Within two weeks SED will be soliciting additional 4+1 and alternative Regents assessment. The department will review and then add those new exams to the list.

Do not have a CBT timeline for regents.

The New engageNY - Shannon Logan, Coordinator, Technology Policy Office of Educational Design and Technology, SED.

Completely in-house at SED.

Popularity of the site continues to grow to 700K active users a month globally.

New look

Ease of access and functionality.

Curriculum is the most used and so that has been moved front and center.

Teacher practice video for the Danielson and NYSUT rubrics. Sort clips aligned to that specific rubrics. Looking for a better way of organizing them on the site.

STANYS Conference - March 2016

Schalmont was host to STANYS

I was invited to attend and here are my notes from the session with Brett Moulding a contributing member to the NGSS.

Brett Moulding, Director of the Partnership for Effective Teaching and Learning and Essential Teaching and Learning. Brett was also a contributing a member to the NGSS.

State teacher associations are important for long term sustained vision. Important to belong to something bigger than your classroom.

Professional learning is more important than professional development. Professional learning is what you do every day and over a career.

As a professional you will continue to change. You will find what works best for your students. Important to think about teaching in diverse ways. Important to see students in many different settings.

You have always been accountable to your students and their parents, even before standardized testing.

The three dimension in the new standards - There are not to be taught separately.



1989 - Science of All Americans - started a new trajectory. Prior to that science was being driven from the space race/Sputnik era. (Sputnik was about getting some kids ready to be engineers, not all kids) - from Okhee Lee

- All students will learn science.
- Provide the foundational knowledge for those who will use in careers.

NGSS Standards - Committee of 45 people worked on the standards, 32 of which currently teaching.

Professional Development in teaching the three dimensions all together.

Science and Engineering Practices

- 1) Asking questions (science) and defining problems (engineering) - difficult job to create an environment in which students ask questions. Ss are born investigators. Who do we do this in away that makes science? Gathering (Ask questions/Define Problems, Plan & Carry Out Investigations, Use Mathematical & Computational Thinking, Use Models to Organize Data and /or Information), Reasoning (Evaluate Information, Analyze Data, Use Mathematics and Computational Thinking, Construct Explanations/ Solve Problems, Develop Arguments for why or how Evidence Supports Explanations or Claims, Use Models to Predict & Develop Evidence), and Communicating Reasoning (Communicate Information, Argue from Evidence (written & oral), Use Models to Communicate). You get paid to have students reason (thinking). We are in the thinking business, not for use to think but create the opportunities for students to think.

We are asking Ss to look for the causes within systems. If it doesn't have a cause, it is probably magic. Energy and Matter are big deals because they cause systems to change. Is the system changing or stable. What are the components within a system that cause them to change.

What is a phenomena - Anything that is observable and has a cause is a phenomena. They are not phenomenal, they are everyday things. Gravity for example. One years olds study gravity in great depth.

Any phenomena that we want to study we should define systems to investigate, finding and using patterns as evidence determine cause and effect relationships.

Thinking about phenomena and finding out what science is about.

The core idea are to be used to understand the world around students.

Core ideas or conceptual models - They are in the standards but are they in your student's heads.

This is not about knowing core ideas - it is about using core ideas.

We are not teaching students about science. We are engaging them in the practices of sciences.

Activity:

We did an activity with two balloons and a sprinkler system valve. We blew up the two balloons and connected them to each side of the valve. We then opened the valve and observed what happened. The one balloon was large and the second was the size of a grapefruit. I thought that they would equal out. This was not the case. The larger balloon took in more air and the smaller balloon shrank in size. The phenomena that we were looking at was not air pressure but elasticity. This happened because the balloon that was larger had more elasticity than the smaller balloon. I observed to my science friends that it is more difficult to start blowing up a balloon than it is to finish blowing up a balloon and they confirmed that the answer was yes. The more the balloon expands the less force is needed to continue expanding the balloon.

This caused a lot of discussion among the group and many people did not get it right. Many people (most) were caught up in the air pressure.

You are teaching about matter, energy and forces. You need to listen for kids to use the wrong one. We tell kids that food is energy. Food is matter, rearranging the chemical makeup will produce energy.

Crosscutting Concepts in Science Performance

Crosscutting Concepts - Not new but now incorporated right into the standards and are explicit within the Performance Expectations. Matter and Energy are part of the Crosscutting Concepts. Had Brett been in charge, Forces would have been there as well.

Activity:

We looked at why the quaking aspens that Brett has transplanted several times leaf out at different times in the spring (roughly a month apart) [a phenomenon]. We were allowed to use devices to develop question, formulate answers and finish by writing our explanations.