

WASHINGTON SCIENCE TEACHERS ASSOCIATION

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Dedication to advocating and promoting quality science education for all, at all levels of instruction.

WSTA JOURNAL PURPOSE:

To provide timely and relevant information about Science Education, Professional Development and WSTA news and services to members of the Washington Science Teachers Association and partners.

The journal is a Quarterly Publication (ISSN 0164-7369), electronic only, linked to the Washington Science Teachers Association Website at www.wsta.net. It is readable and downloadable to WSTA members and specific partner organizations and libraries.

The Journal solicits articles on science education topics, relevant to science teachers and educators in K-12 and higher education, from anyone, whether they are members of WSTA or not. Research articles are accepted but the publication is primarily for information and professional development to the readers. Publication is free to the author(s), and the article is peer-reviewed prior to publication and is a citable source.

Publication Dates

February 28th
May 31st
September 30th
November 30th

Material Deadline, New material for peer review Deadline

January 15th, January 3rd
April 15th, April 1st
August 15th, August 1st
October 15th, October 1st

Editor Contact

John P McNamara,
McNamara Research in Agriculture Firm,
510 SE South St, Pullman, WA, 99163-2234,
509 592 0099,
mcnamjpt205@frontier.com

Articles should be in Word format, 12 point type, Times New Roman, with 1 inch margins, NO line justification, NO line or numbers. Formatting should be minimal, but titles, subtitles, headlines, bullets, outline formats should be included or indicated. Tables should be set up using Microsoft Word Table, and Figures using Microsoft Word or Excel. Figures should be set up and formatted to be printed in 3 1/2 in wide column, or 1/2 page format and this should be indicated. Approximate placement of Tables and Figures in the articles should be indicated.

Preparation and Publication of the Journal

All articles and materials for publication should be sent electronically to the Editor at mcnamjpt205@frontier.com by the deadline date.

Material will be checked and edited and minor formatting conducted. All copy will be bundled and emailed to Kelly Lavelle within 1 month of publication date.

Publication will be electronic only, on the WSTA website and accessible to WSTA members.



MISSION AND GOALS

The Washington Science Teachers Association is an organization dedicated to advocating and promoting quality science education at all levels of instruction. Our goals include:

1. Promoting professional knowledge and growth.
2. Maintaining an ongoing communication network for science educators.
3. Exploring and supporting curriculum development.
4. Recognizing and rewarding excellence.
5. Creating public awareness of the importance of quality science education.
6. Forming an organized voice on pertinent legislative policies and issues.

To help meet these goals, WSTA does the following:



Maintains an active website (www.wsta.net) with the latest information on science education and professional development, and an on line learning center.



Produces the WSTA Quarterly Journal and newsletter with the latest information on Science Education in the State and Nation.



Provides direct notification, through the website and email on professional development from a variety of sources and for all grade levels and subjects.



An organized voice promoting science education in Olympia.



Conducts ongoing up to date Professional Development on implementing the Next Generation Science Standards.

We always welcome your membership and encourage you to become actively involved!

Ongoing activities that WSTA is conducting to serve you by meeting our goals include:

- Regional reps make personal contact with each regional member regularly to update them on WSTA activities and solicit their ideas with each member of their region regularly to update for professional development and other support.
- Develop and provide low-cost or free, serious professional development on the next generation science standards, most recently the “Progression through the Waves” on Physical Sciences standards relating to wave functions, which reached over 100 school districts. That is ongoing, and we have the New Geology Professional Development on ESS, see details in this issue
- Working with our representatives at OSPI to help ensure quality implementation of the NGSS and of assessment, WSTA members are routinely on the teams for assessment development and review and provide input to OSPI on quality assessment.
- Co-hosted the NSTA Regional Conference in Portland in December 2016 to more than 1000 teachers and educational administrators.
- Delivered the next WSTA Annual Conference October 20 to 22, 2017 at Chiawana High School in Pasco on “3-Dimensional Learning in the Tri-Cities” to almost 300 educators with great keynote speakers.
- Announce this WSTA 2018 Annual Conference Oct 19, 20, 21 at the Sheraton 4 Points in Bellingham, “3D Learning: Shifting the Paradigm in the PNW”
- Provide thousands of dollars in science teacher awards and in scholarships to pre-service and new teachers!



Judy Shaw teaches beautiful geology!



letter from the
PRESIDENT

*January 2018
Happy New Year WSTA!*

As we start 2018, let's take a brief moment to reflect about all of the wonderful things that took place during 2017. The beginning of each year is also a great time to plan out the remaining twelve months in hopes to organize our lives.

A year in review of 2017 highlights so many wonderful events and activities.

ENGAGEMENT IN WSTA

There was multiple professional learning opportunities around Washington state ranging from NGSS 3D strands, Science Cafes and Oly Science and Brews!, and many, many others. Attendees praised these events stating, "Great way to look at a single DCI and follow it through K-12." As well as, "I feel so much better about NGSS and beginning to figure out how to incorporate them in my teaching. Thank you!"

Over 300 people met up at Chiawana High School in Pasco, WA for the 2017 Annual Conference. A huge thank you to the administration and staff at Chiawana High School and to all of the people that made this 2017 conference a success. The [2017 conference program](#) is available to review exhibitors and speakers information.

The leadership within WSTA was part of a joint effort of the chapters from California, Nevada, and Oregon to compose the [white paper](#), "Priority Features of NGSS-Aligned Instructional Materials: Recommendations for Publishers, Reviewers and Educators."

SAVE THE DATES

WSTA members, be sure to block out the time October 19, 20 and 21, 2018. The WSTA Annual Conference will be in beautiful Bellingham, WA at the Sheraton 4 Points Hotel and Conference Center. Our theme "3D Learning: Shifting the Paradigm in the PNW" captures our focus on high level 3D NGGS professional development. The conference will feature fewer and higher level workshops on key aspects of the NGSS.

We are excited to showcase the majestic scenery of northwest Washington and the wonderful work in science education happening in this part of the state. Future science conferences include the NSTA regional conference in Seattle, WA in December 2019, and the WSTA annual conference in Wenatchee, Fall 2020.

Finally, if you are interesting in serving on the leadership team, elections are coming up. Please consider being a part of WSTA and supporting teachers across Washington state. Have a wonderful rest of the school year and see you at a WSTA event!

Thank you for all you do for science education!

Respectfully,



Andy Boyd
WSTA President 2017 – 2019



OSPI | Chris Reykdal
State Superintendent

Washington Remains Leader for National Board Certification

OLYMPIA—JANUARY 8, 2018—Washington continues to be a leader in increasing its number of National Board Certified teachers.

Numbers released today by the National Board for Professional Teaching Standards (NBPTS) show that Washington has the most new National Board Certified teachers (NBCTs) of any state (1,434*). The total number of 10,135 NBCTs is third in the country overall.

Certification is a one- to five-year process that includes taking an assessment and assembling three portfolios. According to the NBPTS, completing the certification shows that each teacher knows and practices “the definitive standards of accomplished teaching.”

“Congratulations to all the newly-certified teachers and those who renewed their certificates,” said Chris Reykdal, Superintendent of Public Instruction. “It takes a lot of sustained and intentional work to become a National Board Certified teacher, and it’s a testament to the dedication of our teachers that so many continue to pursue it.”

“The popularity of the program has taken a statewide effort,” Reykdal continued. “Governor Jay Inslee, the Washington Education Association, and the Center for Strengthening the Teaching Profession – as well as broad bipartisan legislative support – has not only put us on the NBCT map, but has kept us there.”

“Washington’s teachers are some of the finest in the country and this additional certification will make a tremendous difference to their students, schools, and communities,” Gov. Inslee said. “There is no more important job than a teacher as their work impacts countless lives and futures. I applaud these Nationally Board Certified teachers for their hard work and determination.”

In 2007, the Washington State Legislature began awarding a \$5,000 bonus to each NBCT. Teachers can receive up to an additional \$5,000 bonus if they teach in “challenging” schools, which are defined as having a certain percentage of students qualify for free and reduced-price lunch (50 percent for high schools, 60 percent for middle schools, and 70 percent for elementary schools).

Washington by the numbers for 2017:

- Number of new NBCTs: 1,434 (national rank: 1st)
- Number of renewed certificates: 533
- Total number of NBCTs: 10,135 (national rank: 3rd)
- 88 percent of all Washington’s NBCTs (about 8,900) remain actively engaged in education

“Washington’s educators are among the best in the country in large part because of the support we offer them to grow and develop,” said Kim Mead, President of the Washington Education Association (WEA). “I’m proud of the role WEA plays in supporting our members pursuing their national certification with high-quality training and peer support through this rigorous process. Our educators’ commitment to excellence is a reflection of their commitment to our students.”

“We are excited that so many accomplished Washington teachers have successfully demonstrated their ‘accomplished-ness’ in the classroom with students and are now NBCTs,” said Nasue Nishida, Executive Director for the Center for Strengthening the Teaching Profession (CSTP).

“The Washington State National Board Network Partners (CSTP, OSPI, and WEA) have worked together to develop, maintain, and sustain a structure of support for teachers pursuing National Board; incentives after they achieve; and leadership development opportunities as they continue their journey in the profession. This year’s number is an indication that what we do in Washington state is working,” Nishida continued.

“More intentional and more focused”

Winlock, Wash., is about an hour’s drive north of Vancouver. Nearly four out of every five students at Winlock Miller Elementary School receive free or

reduced-price meals. Tori Nelson is a fourth grade English language arts teacher at Winlock Miller and the first teacher in her district to become an NBCT.

Nelson said the process took three years. "I wouldn't have done it without the support of the superintendent at the time," she said. "She pushed me to do it and gave me the time. She saw something in me and felt like it was something I could accomplish."

For Nelson, achieving certification forced her to take a deeper look at how she approached her job. "Teaching is a pretty difficult job," she said. "When you have to break down every little thing you do, you're forced to really reflect on everything you're doing in the classroom. That pushes you to become more intentional and more focused. It also reminds you why you do what you do: to help kids. It's a good incentive to keep the kids as your number-one focus."

"There were days when I told myself that I was a better teacher than I thought," Nelson added, "and there were days when I said, 'Wow, I have a lot of things to work on.'"

Nelson noted that being an NBCT has put her in a mentor role in her district. "It's one thing to teach children," she said, "but it's another thing to teach teachers. I think that's a pretty good way to better yourself as an educator."

Nelson said she would recommend other teachers going through the certification process. "Some people may look at it as just another hoop to jump through," she said. "But it really is a process that makes you break down your teaching and helps you grow. It requires you to dissect what you do, and why you do it. That forces you to better yourself."

About Board certification

Since 2009, Washington state has offered a conditional loan program to help candidates pay for the cost of certification. Loans are repaid by teachers with the bonuses they earn after becoming certified. To date, more than 4,000 conditional loans have been offered, and \$5.5 million has been repaid to the revolving fund, allowing the state to continue to award future loans.

Certification consists of four components:

1. An assessment of the teacher's content knowledge.
2. A portfolio showing work students have done and the teacher's feedback to the student.
3. Two videos of the teacher in the classroom, showing lessons taught and the interaction with and among students.

4. A portfolio of “reflective” work: what the teacher does outside the classroom that translates in the classroom.

The last three components are assessed by a national panel of peers.

Created in 1987, the [National Board for Professional Teaching Standards](#) is an independent, nonpartisan, and nonprofit organization devoted to advancing the quality of teaching and learning.

For more information

- [NBCTs by district](#)
- [About NBCT - OSPI](#)
- [Why National Boards Matter \(video\)](#)

** This number varies slightly from the number reported by the Board. The Board relies on teachers to self-report and maintain their contact information. Some teachers choose not to share that information. OSPI relies on a combination of personnel data and Board data, which the Office considers to be more accurate.*

Contact

[Nathan Olson](#)

OSPI Communications Director
360-725-6015

About OSPI

The Office of Superintendent of Public Instruction (OSPI) is the primary agency charged with overseeing K–12 education in Washington state. Led by State Superintendent Chris Reykdal, OSPI works with the state's 295 school districts and nine educational service districts to administer basic education programs and implement education reform on behalf of more than one million public school students.

OSPI provides equal access to all programs and services without discrimination based on sex, race, creed, religion, color, national origin, age, honorably discharged veteran or military status, sexual orientation, gender expression or identity, the presence of any sensory, mental, or physical disability, or the use of a trained dog guide or service animal by a person with a disability.

Questions and complaints of alleged discrimination should be directed to the Equity and Civil Rights Director at 360-725-6162 or P.O. Box 47200, Olympia, WA 98504-7200.



Priority Features of NGSS-Aligned Instructional Materials

*Recommendations for
Publishers, Reviewers
and Educators*

Published by:
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Writers

Andy Boyd, President, Washington Science Teachers Association;
Math & Science Specialist, North Central Educational Service District

Dara Brennan, President, Oregon Science Teachers Association;
STEM Teacher on Special Assignment (TOSA), Springfield School District

Jenny Chien, Elementary STEM Specialist, Casita Center,
Vista Unified School District

Elizabeth de los Santos, Assistant Professor, Secondary Science Education,
University of Nevada, Reno

Susan Gomez Zwiep, Professor, Science Education,
California State University, Long Beach

Jill Grace, President, California Science Teachers Association;
Regional Director, K-12 Alliance @ WestEd

Michelle Habdas, Teacher, 7th & 8th Grade Integrated Sciences,
Washoe County School District

Susan Holveck, Science Specialist, Beaverton School District

Phil LaFontaine, Regional Director, K-12 Alliance @ WestEd

Traci Loftin, K-5 Science Teacher on Special Assignment,
Washoe County School District

Shawna Metcalf, Teacher Specialist – Secondary Science,
Glendale Unified School District

Marian Murphy-Shaw, Educational Services Director,
Siskiyou County Office of Education

Jessica L. Sawko, Executive Director, California Science Teachers Association

Sylvia Scoggin, K-12 Science Program Coordinator,
Washoe County School District

Bret Sibley, President, Nevada State Science Teachers Association;
Science Regional Trainer, Southern Nevada Regional Professional
Development Program (SNRPDP)

Jomae Sica, Chemistry & Engineering Instructor,
Mountainside High School, Beaverton School District

Camille Stegman, Executive Director,
Nevada State Science Teachers Association

Contributors

K-12 Alliance @ WestEd

California Science Project

CSTA's NGSS Committee (2017-18)

CSTA Board of Directors (2017-18)

Priority Features of NGSS-Aligned Instructional Materials

Abstract

The Next Generation Science Standards (NGSS) require classrooms to integrate a three-dimensional approach to teaching and learning such that students routinely use the Science and Engineering Practices and apply the Crosscutting Concepts as primary tools to engage in sense-making to deepen their understanding of the Disciplinary Core Ideas. The Science Teachers Associations of California, Nevada, Oregon, and Washington recognize that teachers have started to make the necessary instructional shifts during this transition period, and they need strong K-12 instructional materials for the vision of the NGSS to become reality. Our review of the current literature on science education suggests that instructional materials need to address two major areas: (1) providing students with relevant learning experiences that cause them to build on or challenge their prior knowledge as they build conceptual understanding to explain phenomenon or design solutions to problems; and (2) providing teachers with guidance for how to facilitate student-centered learning to maximize student understanding. This paper provides criteria—endorsed by the four states and their partners—that are expected to be found in high-quality instructional materials that support the complex teaching and learning required by the Next Generation Science Standards.

Introduction

In 2013, Achieve, Inc., released the Next Generation Science Standards (NGSS), a new set of science education standards based on years of research on how students best learn science and guided by input from classroom teachers, education researchers, scientists, and higher education professionals. Since their release, 18 states (including California, Nevada, Oregon, and Washington), the District of Columbia, and the territory of Guam have adopted the NGSS. As states begin to implement the standards, educators are gaining an appreciation for the complexity and richness of the NGSS, the instructional shifts that are required to facilitate student understanding and learning, and how to uphold the vision of *All Standards, All Students* (see Appendix D of the NGSS). These same educators are recognizing the importance of high-quality instructional materials for the full implementation of the NGSS.

The purpose of this white paper is to emphasize characteristics of instruction and resource materials that are critical for teachers engaging students in high-quality science instruction to meet the full vision of the NGSS. The characteristics, conclusions, and recommendations presented in this paper represent the voice of science teachers in our respective states (California, Nevada, Oregon and Washington) and are informed by our state experts who have been implementing the NGSS, along with input from references that helped develop our understanding of the vision and intent of *A Framework for K–12 Science Education* and the standards themselves (NGSS Lead States, 2013).



Summary of Recommendations

Our goal is to ensure equitable access for all students to see themselves as a part of the scientific enterprise, to experience science as a human endeavor, and to understand the value of science for making sense of their world. High-quality instructional materials play a vital role in achieving this goal.

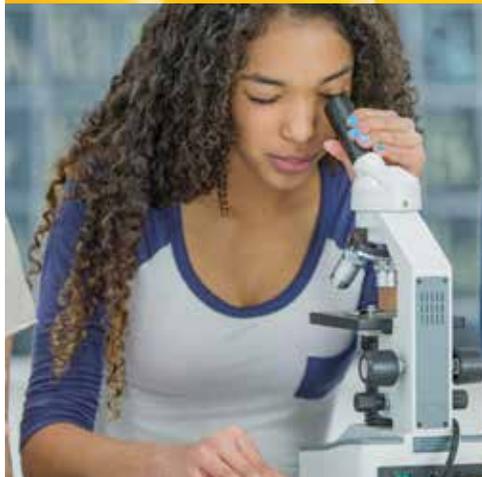
Instructional materials must have coherence in design and support equitable access to meet the diverse needs of every student. This coherence of instructional materials and their multiple components is paramount to student success. One mechanism to enable this is to understand and address student preconceptions while valuing their insights, perspectives, and experiences to help frame and build new knowledge constructs (NRC, 2000, pp. 14-15) (Schwarz, Passmore, & Reiser, 2017, p. 33-34).

To fulfill the vision of *All Standards, All Students*, instructional materials must support the shifts towards more equitable, active, and engaged learning for all students. Instructional materials should provide specific supports for instruction that is appropriately rigorous and challenging, and structured in such a way as to provide equitable access to meet the diverse needs of every student regardless of background or learning characteristics. These supports must ensure that science is an intellectually rich, relevant, and engaging experience for all students while leveraging the unique perspectives and assets of students. (CDE, 2016, Ch. 10, pp. 3-5; Schwarz, Passmore, & Reiser, 2017, p. 33-34).

Additionally, a logical progression of each of the three dimensions of learning—Science and Engineering Practices, Disciplinary Core Ideas, and Crosscutting Concepts—of the NGSS is necessary to build coherence for deep understanding of phenomena focused on the natural and human-built world; including how each impacts the other. Learning must be anchored in phenomena and problems that are appropriate for students, drive learning, and allow for scientific understanding to build over time. Multiple opportunities must be provided for students to express their understandings of the phenomena and problems under study in various formats. Materials should not only support a three-dimensional approach to learning in which students utilize Science and Engineering Practices and apply Crosscutting Concepts to understand Disciplinary Core Ideas, but they should also engage students in iterative sense-making as scientists do.

Instructional materials should support a classroom assessment system aligned with experiences in the text, auxiliary information, and supports for the needs of students. This must assess students in all three dimensions (including the nature of science), move students toward demonstrating application of knowledge instead of memorization of facts and vocabulary, and be useful in guiding instruction. Instructional materials also need to support the full intent of course models with partial or full integration of science.

Finally, there is a very great need for materials to prepare students for a technologically rich future by supporting the full intent of two key Science and Engineering Practices—Analysis of Data and Mathematics and Computational Thinking—and their connection with other practices.



Recommendations

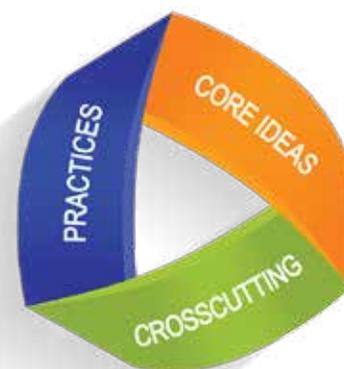
To fulfill the expectations envisioned in the NGSS, with full engagement of students in science, the following aspects must be incorporated into instructional materials as outlined and discussed below.

Three Dimensional Learning

Learning and doing science requires complex thinking, thus the three dimensions of Disciplinary Core Ideas (DCIs), Science and Engineering Practices (SEPs), and Crosscutting Concepts (CCCs), should not be presented as separate entities but must be integrated together in instruction and assessment (NASEM, 2017, p. 9).

Instructional materials should provide consistent opportunities for students to routinely use Science and Engineering Practices and apply Crosscutting Concepts as primary tools to engage in sense-making and deepen their understanding of core ideas. In other words, SEPs and CCCs are used as a means for students to build Disciplinary Core Idea knowledge (NRC, 2012, pp. 8-9).

All three dimensions are considered “the content” that students need to build increasing depth and proficiency in over time. Instructional materials must support multiple opportunities to use and increase the sophistication of knowledge and use of each CCC and SEP throughout the course of instruction (CDE, 2016, Ch. 13, p. 8). Instructional materials must also build understanding of multiple grade-appropriate elements of the three dimensions in a grade-appropriate context of explaining phenomena or designing solutions to problems (Achieve, EQulP Rubric, 2016).



Phenomena and Problems

Instructional materials should focus on explaining phenomena and/or engineering solutions to solve problems and constitute the central reason students engage in three-dimensional learning (Achieve, Using Phenomena, 2016, p. 2; NGSS Lead States, 2013, App. 1).

Instructional sequences should begin with a phenomenon or problem, build understanding over time, and come to closure at the end (CDE, 2016, Ch. 13, p. 11).

Instructional materials and resources should provide for the possibility of substituting phenomena of a more local context to accommodate for student perspectives and engagement. Examples of these include phenomena around observable components of the students’ school or community, local environmental issues, etc. (Achieve, Using Phenomena, 2016, p. 2).

Instructional materials should provide opportunities for students to solve meaningful problems through engineering in local contexts. This allows diverse students to deepen their science knowledge, come to view science as relevant to their lives and future, and engage in science in socially relevant and transformative ways (NGSS Lead States, 2013, App. 1, p. 2).



Instructional materials should provide real world phenomena and problems that are used to drive instruction and support a coherent storyline. Students engage in the SEPs and CCCs as a way of answering questions that arise from the study of phenomena or to design solutions to real world problems, thus deepening understanding of targeted DCIs (CDE, 2016, Ch. 13, p. 11).

Phenomena or problems presented to students must be from our natural or human-built world (including, when appropriate, where they intersect), observable to students, developmentally appropriate, relevant, and interesting to students, thus providing opportunities for students to investigate, model, and explain thinking orally and in written form with evidence and reasoning. They must be explainable or solvable using targeted, grade-appropriate DCIs, SEPs, and CCCs and not just attention-getters but drivers of learning (CDE, 2016, Ch. 11, pp. 8-11).

Part of the learning process in deepening the understanding of DCIs is how students practice modeling as it pertains to phenomena. Students are expected to construct and revise models based on new scientific learnings to predict and explain phenomena and to test solutions using core ideas. Taking part in SEPs like Developing Models provides students the opportunity to practice science and engineering that mirrors the science community's work and thinking. Instructional materials should support this. (Krajick & Merritt, 2012, p. 7).

The iterative cycle of design should be reflected in instructional materials as it offers the greatest potential for applying science knowledge in the classroom and engaging in engineering practices. When designing solutions to a problem, engineering DCIs must be integrated with developing DCIs from physical, life, and/or earth and space sciences (NRC 2012, pp. 201-2; Achieve, EQuIP Rubric, 2016).

Student Engagement and Sense-Making

Instructional materials should provide learning experiences that connect with the interests and experiences of students in order for students to effectively build knowledge (NRC, 2012, p. 28). Instructional materials should support this and allow for flexibility in students' pursuing learning objectives that expand entry points for student engagement. Whenever possible, students' learning experiences should be first-hand (NASEM, 2017, pp. 17-18).

Instructional materials should also provide many opportunities for student-driven inquiry. Although scientific ideas (DCIs) may be "known" to the education and scientific communities, they are not necessarily "known" by the student, since this knowledge develops over time. Effective instructional materials support students using what they do know and engaging in productive struggle—testing and re-evaluating their ideas—in order to build scientifically aligned understanding of the DCIs. This complements how scientists come to "know" (through use of SEPs and CCCs). Thus, what happens in K–12 science classrooms will mirror what happens within the scientific community: Sense-making, or making sense of the world, as the fundamental goal of science (Schwarz, Passmore, & Reiser, 2017, p. 6; NASEM, 2017, p. 12).





The focus of instruction must be learner-centric. To support this, materials should support discourse and the types of conversations that students need to support their sense-making and engagement in science. Materials also should support student use of the SEPs and CCCs to provide the context and substance to engage in these discussions and sense-making opportunities. Scientific knowledge is revised and clarified in light of new information, and instructional materials should allow space for students to revise their own thinking with new evidence and discussions and insight about scientific ideas (DCIs) (CDE, 2016, Ch. 13, p. 11).

Further, materials should support opportunities for students to engage in the social negotiation of ideas and consensus building about scientific ideas through the development of evidence-based models and explanations and obtaining and communicating information and engaging in argumentation, as well as the use of Crosscutting Concepts to frame and evolve their thinking (CDE, 2016, Ch. 13, p. 10).

Assessment Systems

Instructional materials should include both summative and formative assessments that are aligned with the three-dimensional sequence in the instructional materials. Assessments should require students to engage in the SEPs and CCCs to demonstrate and apply their understandings of the DCIs; they should be woven together in a way that builds cumulatively, and this should go beyond the text-dependent practices of communicating information and writing explanations (CDE, 2016, Ch. 13, pp. 8, 13; NASEM, 2017, p. 23).

Both formative and summative assessments included with instructional materials should provide teachers sufficient information to see where students are on a continuum including students' prior knowledge and preconceptions and to use the results to guide instruction in all three dimensions (CDE, 2016, Ch. 13, p. 13; NASEM, 2017, p. 49).

Materials should provide support for teachers to target Performance Expectation (PE) learning goals as described in the NGSS Evidence Statements, in order to lead *“All students to become proficient in all grade level PEs.”*

Instructional materials for assessments need to be three dimensional with all three strands intertwined, rather than isolated (taught or assessed individually), and reflect the connected use of different SEPs, CCCs, and DCIs (CDE, 2016, Ch. 13, p. 11; NRC, 2014, pp. 2-4).

Materials should provide support for multiple and varied assessment opportunities to support student sense-making related to the target phenomenon or problems with explicit formative opportunities, such as teacher questioning strategies, use of student notebooks, and iterative assessment tasks tied to various practices (e.g., explanations, models, etc.), to assess students' knowledge and skills, promote student-to-student discourse, and guide student learning (CDE, Ch. 13, p. 11; NRC, 2014, pp. 2-4).

Integrated Science

Districts in our states will be considering different course models, some of which can be defined as partially integrated (two domains of science) or fully integrated (life, physical, and Earth and space science). To support these models,



and the intent behind them to help build scientific literacy, materials should support student understanding of how scientists think and their capacity to see the interconnectedness of science across disciplines and contexts. Students will apply this type of thinking to global challenges they will face as adults (NASEM, 2017, p. 5).

For any integrated course, either partial or full, the expectation is that students will actively engage in linking and applying information across relevant and appropriate science domains to make sense of phenomena. There is a significant difference between this approach and a coordinated approach in which students engage in all domains in silos within the same school year (e.g., Unit 1: Life Science, Unit 2: Physical Science, Unit 3: Earth & Space Science). Instructional materials need to take this dichotomy into consideration.

A modular approach to materials may lend itself to both a discipline specific model and a coordinated approach; however, if the modules themselves are domain specific, the lack of integration within this approach makes it difficult to effectively reach the level of integration required in a truly integrated model. Domain-specific modular instructional materials intended to be multi-purposed for discipline-specific, coordinated, and integrated models will need to provide additional support for teachers to develop coherent, relevant, and authentic integrated units using the modules (Sherriff, R., 2015; CDE, 2016, Ch. 5, pp. 10-11).

Support for Analysis of Data and Mathematics and Computational Thinking

“Just as new science enables or sometimes demands new technologies, new technologies enable new scientific investigations, allowing scientists to probe realms and handle questions of data previously inaccessible to them” (NRC, 2012, p. 32).

Instructional materials should make strong connections to other disciplines such as mathematics and they should also support student proficiency in all Science and Engineering Practices (SEPs). Two of the eight practices have particularly strong connections to mathematics: Analyzing and Interpreting Data and Using Mathematics and Computational Thinking. Preparing students for a technologically rich future will require material developers to employ a novel vision in creating materials around these practices. Furthermore, the development of materials for *all* SEPs will require such vision in order to support student growth in understanding and the use of the practices.

Materials should help students understand that they engage in multiple practices when Analyzing and Interpreting Data. Materials should routinely relate Mathematics and Computational Thinking to other SEPs, especially the strong connections with Analyzing and Interpreting Data, Developing and Using Models, Engaging in Argument from Evidence, and Communicating Information (Krajcik, J., 2011, p. 8; Schwarz, Passmore, & Reiser, 2017, pp. 159-204; CDE, 2016, App. 3, pp. 2-4).

Instructional materials supporting the SEPs should provide students with multiple supported opportunities to work with raw data to identify and explain connections and support claims between their questions and the problems they are trying to solve. Whenever possible, this data should be collected first-hand by students as a part of Planning and Carrying Out Investigations. As we





enter into a world of information, students must gain the scientific literacy that involves analyzing data to make decisions about which data are useful and could be used for identification of patterns, relationships, trends and anomalies. Students should be making decisions about how to represent data (visualization tools such as tables, graphs, or diagrams) to make it easier to identify these features and for communicating with others. Students should be routinely engaging in sense-making, collaborating, and revising their thinking when working with data as they attempt to answer questions about phenomena and solve problems (Schwarz, Passmore, & Reiser, 2017, pp. 159-180).

One of the hallmarks of the NGSS is that they require instructional materials to provide explicit alignment with other grade-appropriate content standards, support student connections between these and the science ideas they are exploring, and provide ample student-centered opportunities for student sense-making and critical reasoning, including the extension to new ideas to make predictions or comparisons when age appropriate. Age-appropriateness must be reflected in the phenomena the mathematics is being applied to (tangible, small scale macro-phenomena in lower grades becoming more complex, relationship-dependent, and abstract in upper grades), type of data analyzed (qualitative in lower grades becoming more quantitative in upper grades), and ways of analyzing data (descriptive in all grades, but allowing for the ability to generalize relationships by middle and high school with those relationships becoming more complex with older students, and the use of more sophisticated and precise tools and statistical analyses in upper grades) (NGSS Lead States, 2013, App. F, p. 9; Schwarz, Passmore, & Reiser, 2017, pp. 159-180).

In addition to supports for analyzing qualitative data, materials should support student identification of appropriate tools and computational techniques to help students answer their questions. This will provide a bridge between traditional quantitative data collection and new measuring devices or techniques and help students understand what the new device or tool measures and/or how it functions.

Leveraging technology is essential in implementing the NGSS, especially in the Analysis of Data and Mathematics and Computational Thinking. When appropriate, computers and digital tools can provide an augmentation of mathematics by automating calculations, yielding approximations, and analyzing large data sets to identify meaningful patterns or anomalies. As proficiency is gained in the practice over time, students should not just be using tools that already exist but building their own as they abstract information from the real world into a model. In this case, students should utilize, modify, and develop simulations that represent what they are studying as a mechanism to dig deeper into computational thinking practice, to reveal patterns that enable predictions, and to allow for calibration of the simulation to improve reliability as they account for limitations (NGSS Lead States, 2013, App. F, p. 10; Schwarz, Passmore, & Reiser, 2017, pp. 181-204; CDE, 2016, App. 3, pp. 2-8).

NGSS Shifts Call for Educative Curriculum

Teachers will need assistance in making the shifts to NGSS instruction. Educative curriculum materials have the potential to provide job-embedded professional learning experiences as they progress in their ability to implement



full NGSS instruction (Davis, et al., 2017). Educative instructional materials have design features that promote teacher and student learning, including pedagogical content knowledge in three-dimension learning, pedagogical content knowledge in scientific inquiry, and subject matter knowledge (Davis & Krajcik, 2005).

NGSS-aligned instructional materials should align to the design heuristics of educative instructional materials including,

1. engaging students with topic-specific scientific phenomena;
2. using instructional representations that support student understanding;
3. anticipating, understanding, and dealing with students' ideas about science;
4. engaging students in questions;
5. engaging students with collecting and analyzing data;
6. engaging students in designing investigations;
7. engaging students in making explanations based on evidence; and
8. promoting scientific communication.

Ensuring that educative materials support teachers as they create NGSS-aligned classrooms is critical for the success of full implementation. The emphasis should be in helping teachers recognize the importance of students' ideas and providing insight into what ideas from students will be likely within a topic and how teachers might deal with student ideas in their classroom, for example, by giving suggestions of thought experiments likely to promote the development of more scientific ideas (Davis & Krajcik, 2005).

Our Associations are focused on advocating for high-quality coherent resources and instructional materials to support teachers in full implementation of the NGSS. We firmly believe that carefully planned and well-designed materials are critical components for our students and teachers to reach the full expectations and vision of the NGSS. We stand ready to support publishers in the endeavor of designing and developing the necessary instructional materials.



Supporters

In addition to the California, Nevada, Oregon, and Washington Science Teachers Associations, the following organizations and individuals have reviewed and support the recommendations in this white paper:

California Science Project

Children Now

Code.org

California Curriculum and Instruction Steering Committee (CISC) –
Science Subcommittee

Helen Quinn, Chair, National Academy of Science’s Board on Science Education (2009 - 2014); Co-Chair, California Framework and Evaluation Criteria Committee for Science (2014 - 2015); and Professor of Particle Physics and Astrophysics, Emerita, at SLAC National Accelerator Laboratory

K-12 Alliance @ WestEd

National Science Teachers Association

Nevada STEM Coalition

Ten Strands

References

- Achieve, Inc. (2016). EQuIP Rubric. Retrieved from: <http://www.nextgenscience.org/resources/equip-rubric-lessons-units-science>
- Achieve, Inc. (2016). Using Phenomena in NGSS-Designed Lessons and Units. Retrieved from: <http://www.nextgenscience.org/sites/default/files/Using%20Phenomena%20in%20NGSS.pdf>
- California Department of Education (CDE) (2016). *2016 Science Framework for California Public Schools Kindergarten through Grade 12*. Retrieved from: <http://www.cde.ca.gov/ci/sc/cfl/scifwprepubversion.asp>
- Davis, E. A., et al. (2017). Educative Curriculum Materials: Uptake, Impact, and Implications for Research and Design. *Educational Researcher*, 46(6), pp. 293–304.
- Davis, E. A., & Krajcik, J. S. (2005). Designing educative curriculum materials to promote teacher learning. *Educational Researcher*, 34(3), pp. 3–14
- Krajcik, J. (2011). Helping Young Learners Make Sense of Data: A 21st Century Capability. *Science & Children*. Arlington, VA: NSTA Press
- Krajcik, J., & Merritt, J. (2012). Engaging Students in Scientific Practices: What Does Constructing and Revising Models Look Like in the Science Classroom? *Science Scope*, 35(7), pp. 6–8. Arlington, VA: NSTA Press.
- National Academies of Sciences, Engineering, and Medicine (NASEM) (2017). *Seeing Students Learn Science: Integrating Assessment and Instruction in the Classroom*. Washington, DC: The National Academies Press. <https://doi.org/10.17226/23548>
- National Research Council (NRC) (2014). *Developing Assessments for the Next Generation Science Standards*. Washington, DC: The National Academies Press. <https://doi.org/10.17226/18409>
- National Research Council (NRC) (2012). *A Framework for K–12 Science Education: Practices, Crosscutting Concepts, and Core Ideas*. Washington, DC: The National Academies Press. <https://doi.org/10.17226/13165>
- National Research Council (NRC) (2000). *How People Learn: Brain, Mind, Experience, and School: Expanded Edition*. Washington, DC: The National Academies Press. <https://doi.org/10.17226/9853>
- NGSS Lead States (2013). *Next Generation Science Standards: For States, By States*. Washington, DC: The National Academies Press.
- Penuel, W. R. (2017). Research–Practice Partnerships as a Strategy for Promoting Equitable Science Teaching and Learning Through Leveraging Everyday Science. *Science Education*, 101(4), pp. 520–25. <https://doi.org/10.1002/sce.21285>
- Schwarz, C. V., Passmore, C., & Reiser, B. J. (2017). *Helping Students Make Sense of the World Using Next Generation Science and Engineering Practices*. Arlington, VA: NSTA Press.
- Sherriff, R. (2015). Middle School Madness Part 2: Integrated Science Versus Coordinated Science. *California Classroom Science*, 30(1). <http://www.classroomscience.org/middle-school-madness-part-2-integrated-science-versus-coordinated-science>
- Windschitl, M., Thompson, J., Braaten, M., & Stroupe, D. (2012). Proposing a Core Set of Instructional Practices and Tools for Teachers of Science. *Science Education*, 96(5), pp. 878–903. <https://doi.org/10.1002/sce.21027>



cascience.org



oregonscience.org



wsta.wildapricot.org

WSTA Elections 2018 Call for Nominations

John P McNamara, President Elect

Your Executive Board and your Board of Directors exists to serve you. We hope that you can nominate a colleague or yourself for a position on the Board. The board must and does want to stay fresh with new ideas, as well as provide sufficient institutional history and experience to stay efficient.

This is our 2018 call for nominations, and information on the positions up for election is given here, as well as a brief description of the positions.

Please nominate people for the position through the election information on the website, log in as a member and look for 'WSTA 2018 Election' tab just under the quick links.

The WSTA has a long standing, deep and active Board, which includes the executive officers of Past-President, President and President-Elect, who are elected on a 5-year cycle to serve 2 years as President-Elect, 2 years as President and 1 year as Past-President. This helps ensure both freshness and stability as time goes by. Last year you elected me as President-Elect and thank you. Past-President Roy Beven, President Andy Boyd and I have been working this year to keep making WSTA stronger and better to serve you.

The key working positions are The Executive Secretary, The Recording Secretary and The Treasurer. These people are elected on a 3-year cycle to help keep stability but also allowing change over

time. Last year you re-elected the wonderful and efficient Dana Marsden as the Recording Secretary.

This year, 2018, it is time to elect a Treasurer. This person holds tremendous responsibility to keep the books, collect and pay the bills and help manage the investments of the \$100,000 plus budget of the WSTA. The Treasurer works closely with the Executive Board to make sure the budgets are properly managed and the duties of maintaining a 501-C-3 service organization are carried out.

If you are, or you know of someone who has excellent budgetary management experience (they need NOT be an active or retired teacher but should be familiar with the educational system and with running service/professional organizations to some level), please contact me to discuss a nomination!

We will have the nomination form up on the website in March, but it is not too early to suggest nominees.

The other elected positions are Board Regional Representatives for Regions 1 (ESD 101); Region 2 (ESD 123) and Region 3 (ESD 171). If you are not familiar with these regions or ESD's please look at the Regional Rep Map in this issue. These people work for you on the board, they represent you and your district and your ESD to the Board and bring back support, professional development on teaching (especially regarding the NGSS) and professional development for its own sake...helping themselves and you become leaders in education.



Elected Positions 2018 Election Matrix Executive Board

Position	Current Office Holder	Election Year	Length of Term
Past-President	Roy Beven	5/2013 (pres-elect) 5/2015 (president) 5/2017 (past pres)	5 Years
President - Elect	Andy Boyd	5/2015 (Pres- Elect) 5/2017 (president) 5/2019 (past Pres)	5 Years
John McNamara		5/2017 (pres-elect) 5/2019 (president) 5/2021 (past pres)	5 years
Treasurer	Karen Madsen	2018	3 Years
Recording Secretary	Dana Marsden	2017	3 Years
Executive Secretary	Judy Shaw	2016	3 Years

Regional Representatives

		Re-election Year	Length of Term	Area
Region 1	Jeffery R. Wehr	2018	3 Years	ESD 101
Region 2	Mary Wise	2018	3 Years	ESD 123
Region 3	Kate Lindholm (Whitney Wytko)	2018	3 Years	ESD 171
Region 4	Midge Yergen	2017	3 Years	ESD 105
Region 5	Jonathan Frostad	2017	3 Years	ESD 189
Region 6	Don Pruett	2017	3 Years	ESD 121 Pierce County
Region 7	Carmen Kardokus	2017	3 Years	ESD 113
Region 8**	Mark Watrin	2016	3 Years	ESD 112
Region 9**	Brandi Hageman	2016	3 Years	ESD 114

Job Description
Treasurer

Description:

The treasurer maintains the financial records of WSTA, updates the board at each meeting on the WSTA accounts, coordinates investment management and submits tax and corporation renewal forms yearly.

Term of Office:

Elected for three years on a rotational basis with executive secretary, recording secretary; follows the election of recording secretary.

Tasks/Timeline:

- With the input of the Board, develop an annual budget to be approved by the WSTA Board
- Pay bills and deposit receipts in a timely manner
- Balance the checkbook monthly
- Maintain records of all financial transactions
- Provide a written record of WSTA financial affairs for each WSTA meeting and as requested by the WSTA President
- Ensure completion and timely submission of IRS returns and incorporation renewals
- Ensure that financial records are audited annually
- Renew liability and bonding insurance annually
- Manage the endowments funds for scholarships and awards with the assistance and advice of the Endowment Fund Investment Committee; serve as chair of that Committee
- Serve as registered agent with the Corporations Division of the Secretary of State
- Advise the WSTA Board about use of WSTA funds
- Maintain appropriate long-term financial records according to current guidelines for records retention
- Submit a financial report for dissemination to the board prior to each board meeting

Job Description
Regional Representative

Description:

Serve as a voice on the WSTA Board of Directors representing the respective regional constituents and a voice from the WSTA board to all members, partners and friends in one of the 10 WSTA regions, which are arranged according to the ESD distribution of the state.

Term of Office:

Three year elected position

Tasks/Timeline:

- Prepare for, attend and contribute to board meetings and represent regional constituents
- Assist at the annual WSTA conference, including hosting regional sessions and presenting workshops
- Facilitate state wide professional development and leadership opportunities
- Facilitate regional networking and communications
- Support membership renewal in coordination with Membership Services Chair
- Provide regional news items to the WSTA Journal and web pages throughout the year
- Contribute at least one or more articles for the WSTA journal per year
- Encourage constituent members to write for the journal
- Update the Board on regional activities on a regular basis.

Geology, Physical Sciences Professional Development Opportunities for 2018

The WSTA exists to serve you. One of our major goals is to provide relevant, high quality professional development to complement what is available from Washington OSPI and the Educational Service Districts. Over the last several years we have provided professional development on the Biology End of Course Exams, The NGGS Standards, Wave Functions in the NGGS as well as the workshops at the annual conference.

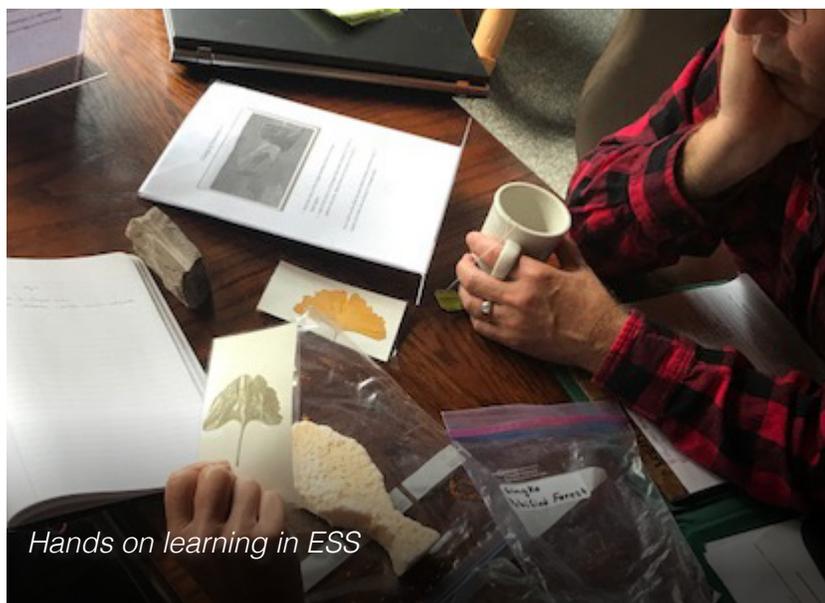
We are continuing these efforts with 'on demand, on site' professional development for your school or district. We are offering the new "NGGS Learning Progression for Waves" which is organized by Award Winning Science Educator Lolo Sherwood; and the brand new "Washington States Earth History" organized by Award Winning Science Educator Mark Watrin. They and their teams have years of excellent experience in many teaching methods and in the NGSS 3D experiences.

Each of these provides deep examples from the NGSS, specifically modeling instruction in the Disciplinary Core Ideas through K-12, and the Science and Engineering Practices and the Cross-Cutting Concepts. They are truly 3D and fully certified for Washington State STEM certification hours.

Lolo and Mark will work directly with you or your school or district specialist to bring the training to you, at a time and place of your choice. The cost is minimal, and the content is serious. As you know, Washington State is a Lead State in Science Education and in adoption and preparation for the NGSS, and WSTA is recognized nationally (by the National Science Teachers Association, The National Conference on Science Education and by Achieve, Inc. as a top organization for support and training in the NGGS.

The next pages give a brief introduction and the contact information you need for setting up this professional development in your district (districts can combine for a given delivery if that is appropriate for you).

Thanks for being a great WSTA member and a great Teacher!



Hands on learning in ESS

Requirements for Washington STEM Professional Development Certification

Requirements for Washington State STEM Professional Development Certification, teaching the NGSS and bringing higher level professional development to you!

Carol Sandison and John McNamara

It is wonderful that Washington is a Lead State in bringing STEM education to all! The requirements that all (or most) of Washington State Teachers, especially in the elementary grades should get a least some regular professional development in STEM fields is vital to the success of more teachers and students and is a major priority of WSTA. WSTA has developed several professional development programs, including Progression through the Waves for Physical Sciences, The Big Dig and Washington Geology Project for Earth and parts of Life Sciences (see other articles in this issue and go to www.wsta.net for information on how to bring this to your district).

In addition, at our annual conference we solicit and choose top workshops that embrace fully the STEM requirements and the NGSS requirements. This year in October at 4 Points Sheraton in Bellingham, we will be conducting our annual conference specifically to bring fewer, more in depth fully STEM and NGSS 3-D experiences to you.

From our recent feedback from 2015 and especially last year after the 2017 conference you want more in depth, higher level, truly STEM and NGSS training and we intend to bring it to you. To do that we must have experienced teachers willing to conduct in depth workshops, perhaps multiple times during the conference, that cover at least two of science, technology, engineering and math with deep coverage of the DCI, SEP and CCC of the NGSS. These may be in depth within one grade band (ELEM, MS, HS), or follow a DCI through the K-12 progression, and clearly integrate science and math, science and technology, science and engineering or any other combination of the 4 legs of STEM.

We solicit such deep proposals and will have the proposal form up on our website by the time you read this. Those of you interested in presenting, or just if you are interested in what the state is demanding and expecting, we have provided, direct from the OSPI website, what good STEM professional development should provide.

If you have any questions about this and/or would like to present a proposal for a workshop this October, please contact one of us (our emails are available on the website and are wstaclockhours@gmail.com and mcnamara@wsu.edu).



There's got to be a fossil in there somewhere!



Fossil Watrin Teaches, that is Watrin Teaches Fossils!

New STEM Clock Hour Professional Development Requirements

Proposed Agenda

a) Hour 1: Model an NGSS lesson (focus would be models, system, explaining, etc.) Choose a topic that is being covered by multiple grade levels (i.e. weathering, water cycle) and present it as a lesson where the participants would be learning some content, but also instructional strategies around NGSS. They could then take any new content knowledge around that topic back to their classrooms and apply it for the appropriate grade level.

b) Hours 2-3: Share our website as a collective of resources and tools that teachers can access for support as they work, prioritize lessons based on the evidence statements for the standards, revisit the 5Es and cohesive “storylines” to help with planning, and plan what science and engineering practices activities work for each kit.

Justification

STEM education for students starts with teachers understanding the Next Generation Science Standards. According to Chad Dorsey in *Perspective: Improving STEM Education with Next Generation Science Standards* (The Concord Consortium), “These are exciting times in education. Public awareness of the need for science, technology, engineering and math education is rising, and new STEM initiatives are beginning across the nation. In this issue, we welcome one of the most important events in this new awareness of STEM, the release of the Next Generation Science Standards (NGSS). These new standards highlight important new dimensions for science education and present many opportunities for technology to aid teaching and learning.” Through our Winter and Spring kit training workshops, teachers will have the opportunity to view the kits for their grade level (new to most elementary teachers due to shifting kit content for the NGSS Transition by our



(ESD112) and identify the lessons and activities that best align to the Science and Engineering Practices, Disciplinary Core Ideas, and Crosscutting Concepts for that grade level. We will be using Evidence Statements to help us create our unit storylines. Teachers will be able to develop crosscutting concept embedded questions around phenomena for the kit storyline to help with cohesiveness between the lessons chosen. **Teachers will also embed an engineering design/redesign activity as part of the unit plan, include activities that allow students to practice using the tools and skills of science, and look for opportunities to integrate math skills when appropriate.** The end goal is to work toward adapting current curriculum to reflect the instructional shifts that NGSS (essentially STEM) requires and create learning opportunities for students that bring the three dimensions of NGSS together.

This proposal clearly indicates that the offering will integrate science, engineering, and math, thus meeting the Criteria.

Activities can be used with students and have an impact on STEM experiences, so 2 of the 3 Guiding Questions are addressed. More information needs to be provided on how the offering provides examples or resources about STEM-related career choices to use with students before this would be eligible for STEM clock hours, as all 3 Guiding Questions need to be addressed and have a “yes” response.

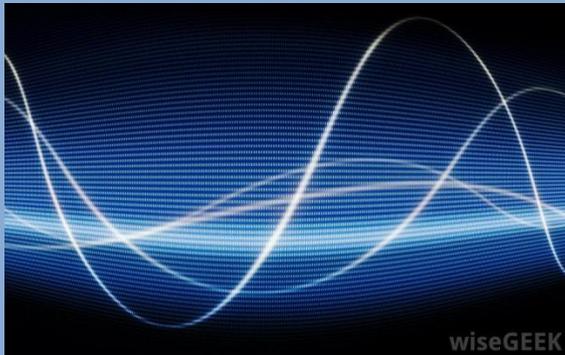
This proposal would not receive STEM clock hours, but is very close. It needs to address the third Guiding Question. With that addition, it would meet the Criteria and Guiding Question, thus being a STEM clock hour offering.

Washington Science Teachers Association Present:
NGSS Learning Progression for Waves

Bring excitement for Science back to your classroom!

You know about Next Generation Science Standards.

You know what NGSS are, but do you know how they can **transform** Science instruction in your practice? Experience how NGSS three dimensional learning can help you **differentiate** instruction so all students learn.



Spend a day with WSTA to add new dimensions to your favorite lessons.

Learn how your instruction fits into the K-12 science framework. Use the Wave standards as a lens to learn how core ideas, science & engineering practices and interdisciplinary crosscutting concepts build through the grade levels. Explore connections to Common Core

Use WSTA resources to explore new ideas!

With peers, design three dimensional lessons that you can take back to your classroom Practice and evaluate 3-D instruction and learning. Have fun exploring new ways to engage students in learning.



For more information check out WSTA.net.

**This Workshop qualifies for 6 STEM clock hours.
THE TIME AND PLACE ARE ON DEMAND.**

Contact: WSTA Professional Development:
lolo.sherwood@gmail.com, 360-301-1562



Why bring Professional Development to your Region, District, or School?

Research indicates that students have deeply ingrained misconceptions about Waves. Teaching Waves Standards in context of real phenomena help students construct accurate understanding about the natural world.

How can you bring this Professional Development to your Region, District or School?

- Flexible Delivery of Professional Development.
- Full day course for teachers/administrators K-12.
- Break into 2 - 3 hour segments to fit district

PD schedule.

- Offered Regionally, by District or Building.
- Qualifies for 6 STEM clock hours.

Cost

\$700 full day; \$400 half day
(plus travel costs)

Build Leadership in your District

We will train local WSTA member teachers as co-presenters!



Why Washington Earth History?

NGSS includes that have traditionally not Earth history standards been a big part of school curriculum.

Using Washington as a context utilizes that local phenomenon students can experience first-hand. Utilizing resources from the Burke Museum, our states natural history museum ensures access to materials and scientists.

Flexible delivery of the professional development.

- A full day course that includes teachers K-12
- Full or half day courses for K-5, 6-8 or 9-12 teachers
- Offered regionally, by district or even by

building.

- Qualifies for STEM clock hours

Cost

\$700 full day; \$400 half day

First offering

- Oct 21st was at the WSTA convention in Pasco
- This PD IS ON DEMAND--contact Mark for scheduling

For details or to schedule a PD session:

Mark Watrin

watrin.mark@battlegroundps.org

360-980-2479

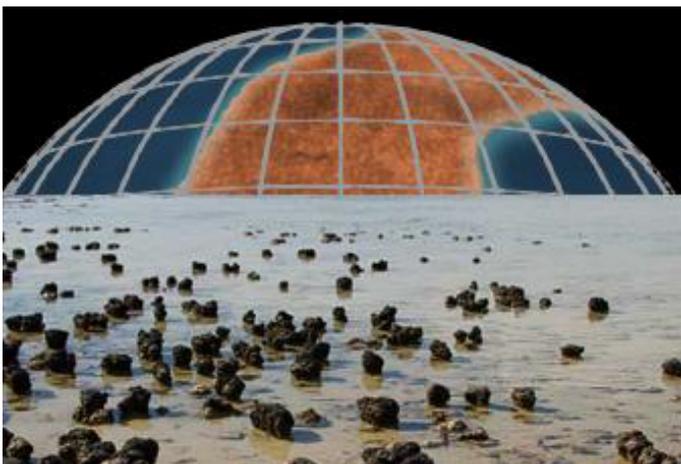
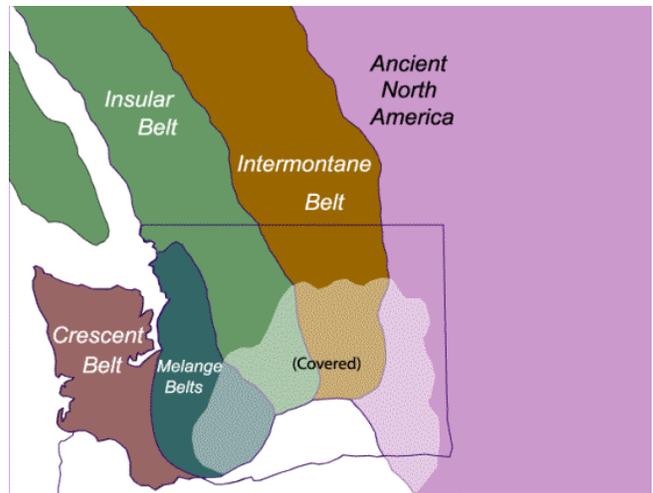
Washington State Earth History

A teacher professional development program from the Washington Science Teachers Association

K-5: Famous Fossils of Washington



6-8: The origin of Washington's geologic landscapes



9-12: Co-evolution of Earth and life in Washington



For details or to schedule a PD session:
 Mark Watrin watrin.mark@battlegroundps.org

Presidential Award Information for 2018

Presidential Awards For Excellence in Mathematics and Science Teaching

YOU CAN BE A WINNER!!!!

Midge Yergen, NSTA Area XVII Director

Are you a full-time grade K-6 teacher with responsibilities for teaching science or math? Have you taught for 5 or more years? If so, you qualify to apply for the Presidential Awards in Mathematics and Science Teaching! Nominations are now open for this prestigious award!

The Presidential Awards for Excellence in Mathematics and Science Teaching (PAEMST) is the highest recognition that a kindergarten through 12th grade mathematics or science (including computer science) teacher may receive for outstanding teaching in the United States. Up to 108 teachers are recognized each year. Presidential Awardees receive a certificate signed by the President of the United States, a trip to Washington D.C. to attend a series of recognition events and professional development opportunities, and a \$10,000 award from the National Science Foundation.

Awardees also join an active network of outstanding educators from throughout the nation. Since 1983, more than 4,700 teachers have been recognized for their contributions in the classroom and to their profession. Awardees serve as models for their colleagues, inspiration to their communities, and leaders in the improvement of mathematics and science education.

To nominate a colleague or yourself, go to www.paemst.org today! Nominations close April 1 and Applications are due May 1.



Excellence in Scholarship Award Information

Nominate a colleague for the Excellence in Science Education Award

Would you enjoy seeing a fellow teacher awarded the WSTA Excellence in Science Education Award? Would you be thrilled to see them receive a check for \$500 and recognition at the state level? It's quick and easy.

Overview

WSTA is an organization dedicated to advocating and promoting quality advancement of science education. Members of the Washington State science community are encouraged to nominate a deserving teacher of science. Awards are made at the four levels: elementary, middle, secondary & higher education. Simply send the name and contact information of a deserving teacher to WSTA Awards & Scholarship Chairperson, Coco Carlson, at sciawards@gmail.com. Coco will send you a form for you to record the accomplishments and character of the teacher you are nominating.

Minimum Requirements

- Three years of science teaching experience
- Current assignment as a part or full-time teacher of science at the elementary, middle, secondary, or higher education.

Demonstrated Qualities

- Current or past participation in local or state science activities or PD
- Excitement and enthusiasm for teaching science
- Effective delivery of scientific content and processes
- Evidence of positive impact on student learning
- Promotion of science education beyond the classroom

The Award

- Local and state recognition honorarium of \$500 to be spent at the discretion of the awardee

Nomination Procedure

The nomination process for WSTA's Excellence in Science Education Award can be completed by anyone

who would like to identify a fellow teacher for this award. To aid in the selection process, the person nominating the teacher will be asked to provide as much information as possible about the teacher. This information may include anything from the following list:

- Science teacher's work experience, and contact information
- Letters of support from administrative supervisor, co-teachers, community partners, students, or parents of students
- Participation in local or state science activities or professional development
- Evidence of excitement and enthusiasm for teaching science, and a positive impact on student learning
- Activities that promote science education beyond the classroom
- Any other evidence of excellence in science education

Deadline

All nominations and support evidence is must be submitted by **June 30, 2018**

Nominations

Nominate a science teacher today by simply sending the name and contact information of a deserving teacher to WSTA Awards & Scholarship Chairperson, Coco Carlson, at sciawards@gmail.com. Coco will send you a form for you to record the accomplishments and character of the teacher you are nominating.

Thank you for helping us continue the tradition of finding and selecting teachers who make an impact on science education in Washington State.

Washington Fellows Network Update

The Washington Science Fellow's Network Rocks On to improve education for all!

Mechelle La Lanne, Managing Director of Science Education, North Central Education Service District.

The Fellows' Network is a group of instructional leaders convened by the Office of Superintendent of Public Instruction (OSPI) and the Association of Educational Service Districts (AESD) to support district and community implementation of state learning standards in mathematics, English Language Arts (ELA), and science, and the Early Learning Guidelines. The Network has steadily grown since its inception in 2013 to include more content areas and instructional leaders.

This three-year leadership program is designed to develop, strengthen, and enhance educators' leadership skills as well as content area pedagogy. Each of the three years has a unique focus. The leadership component is based on the Concerns Based Adoption Model. The content area learning is designed to meet the current needs identified in the state and ties in the Fundamentals of Learning.

All Fellows groups meet four times per year to engage in professional learning and action planning. For science, the first convening is in the fall and is done as a state-wide group. Last fall 230 Science Fellows met in Kennewick to begin their learning by engaging in an engineering design challenge that was the focus for an introduction to formative assessment, this year's content area theme. Additionally, Science Fellows experienced West Ed's *Leading Professional Learning: Building Capacity for Sustained Effective Practice*. The outcomes of this simulation are

- Learn how to connect professional learning activities to specific teacher and student learning needs.
- Understand which inputs are necessary for designing effective professional learning.
- Learn to recognize and address potential constraints and supports for effective professional learning.
- Understand and appreciate the role of leadership in professional learning.
- Understand the essential role of collaboration.

Collaborating with colleagues is important in making change happen in education. One of the goals of



Andy and Mechelle table facilitators



NCESD Science Fellows

Fellows is to encourage teams of teachers to work together to implement NGSS.

Though I'm new to the fellow's team, my time with my colleagues has already been invaluable. Teaching can feel isolating at times and the fellows network has opened some doors to a high level of collaboration working towards an important goal – increasing science literacy in our community's youth. This collaboration is so important and necessary and it's not something that is always prioritized in our busy teaching schedules. It's been so great working with colleagues with a common philosophy and goal and I look forward to where this takes us!

*Molly Ravits
Science Teacher and First Year Science Fellow
Cascade High School*

The Leading Professional Learning: Building Capacity for Sustained Effective Practice simulation is also based on the Concerns Based Adoption Model (CBAM) as is the simulation, Making Change Happen, which all new Fellows participate in at their orientation. These simulations help Fellows learn about the various components of CBAM that they will investigate more closely over their three years. The aspects of CBAM are...

- Innovation Configurations
 - o Fellows will develop a vision for the innovation they are implementing in their setting by clearly defining the components of the innovation and their respective variations.*
- Stages of Concern
 - o Fellows will identify the stages of concern their colleagues, or others, are experiencing and developing a plan to address the level of concern.*
- Level of Use
 - o Fellows will identify the Level of Use of their colleagues regarding the innovation they are implementing and develop a plan to move their colleagues further along the Levels of Use.*

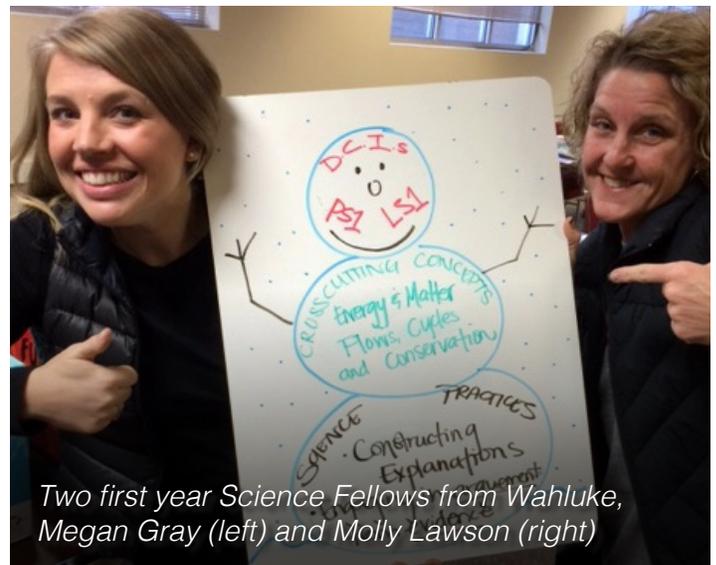
Each year the Fellows will learn a different component of CBAM. This year, Science Fellows are learning about Innovation Configurations by considering how to implement three-dimensional formative assessment for all their students. Additionally, they will make one component of their Innovation

Configurations (IC) map on equity using information from Chapter 11 of the Framework for K-12 Science Practices, Cross-Cutting Concepts & Core Ideas. Fellows will then be encouraged to make an IC map specifically about equity issues in their community after reviewing their district data.

For content this year, Science Fellows have worked on analyzing formative assessments for three-dimensionality. They are in the process of developing their own three-dimensional formative assessments and will then learn about providing feedback to students. In the final convening of the year, Fellows will adapt their formative assessments to meet the needs of all their students. Each Science Fellow received a copy of *Seeing Students Learn Science: Integrating Assessment and Instruction in the Classroom* by Alexandra Beatty and Heidi Schweingruber which is being used to enhance their knowledge of formative assessment. This book can be downloaded for free from The National Academies Press.

Working side by side with my science peers provides me with the best possible learning environment. Each of the Science Fellows comes with our own unique sets of knowledge, experiences and skills. It is a gift to be able to feed off each other's talent. Discussing current challenges while armed with the latest research, we can design and create learning strategies that impact our students' success. It is a gift to us all to be able to collaborate with each other and build on each of our strengths, making a much more powerful implementation of our science curriculum.

Laura Tyler – Seattle Schools



Two first year Science Fellows from Wahluke, Megan Gray (left) and Molly Lawson (right)

If you are interested in being a Science Fellow for your district, OSPI opens applications each spring. (<http://www.k12.wa.us/CurriculumInstruct/Fellows.aspx>)

I would like to extend my gratitude to the OSPI and local ESD regions for creating the Fellows program. This opportunity occurred when I needed it and personally had time to dig deeper into the three dimensions of next generation science standards. I work in a rural district and I am the only one teaching my grade level science classes. The Fellows program created a community of like-minded educators willing to delve into how they think and support science learning in their classrooms.

Lisa Monahan

Liberty Bell Jr./Sr. High School

Contact your Regional Science Coordinator for more information on how you can get involved.

ESD 101 (Spokane) Tammie Schrader tschrader@esd101.net
ESD 105 (Yakima) Mike Brown mike.brown@esd105.org
ESD 112 (Vancouver) Stacy Meyer stacy.meyer@esd112.org
ESD 113 (Tumwater) Scott Killough skillough@esd113.org
ESD 114 (Bremerton) Jeff Ryan jryan@oesd114.org
ESD 121 (Renton) Cheryl Lydon clydon@psed.org
ESD 123 (Pasco) Georgia Boatman gboatman@esd123.org
ESD 171 (Wenatchee) Mechelle LaLanne mechelle@ncesd.org
ESD 189 (Anacortes) Brian MacNevin bmacnevin@nwesd.org

NSTA Updates

Updates from NSTA happenings

Midge Yergen, Area Director XVII and John P McNamara

1. NSTA National Conference Atlanta March 15 to 18, 2018

Sign up now for NSTA's 2018 National Conference on Science Education in Atlanta, March 15–18. Save the most if you sign up by the early bird registration deadline, February 9. NSTA's conference themes will focus on STEM, 3D learning, literacy, and equity, and former Disney teacher of the year Ron Clark will be kicking off the conference. NSTA conferences feature hundreds of sessions to choose from—there's something for every grade level and science discipline. And most science teachers love the exhibit hall as well! It's full of freebies and cutting-edge tech. Attendees can walk into a planetarium, box with lego robots, make a butterfly necklace, try a 3D printer, and more. Learn more and register at www.nsta.org/atlanta.

Join your President Andy Boyd, President-Elect John McNamara and NSTA Area Director Midge Yergen along with other Western State Officers there to learn more about being a leader in WSTA and NSTA!

2. High School Teachers at NSTA National Atlanta.

Are you a high school teacher planning to attend the NSTA National Conference in Atlanta, GA March 15-18? Would you like to share a great, standards driven idea or activity you do with your students? If so, why not participate in the High School Share-a-thon on Saturday, March 17 fro, 11-12:30 in B101 of the Georgia World Congress Center?! You will have space at a table and educators will circulate the room to engage in hands-on activities, collect information and resources, and network with other educators.

Go to: <https://goo.gl/forms/aFDu4NY42iN4yHcm1> and let NSTA know what you would like to share!

3. President Elect Visit to NSTA Headquarters in Arlington VA in November

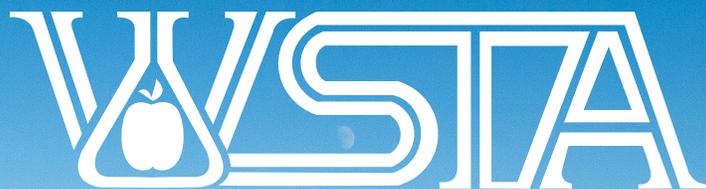
In November President-Elect John McNamara (me) got a chance to visit the NSTA HQ in Arlington VA and meet with Executive Director David Evans; NSTA Director of Membership Erik Schoner; and Assistant Executive Director Jodi Peterson.

We discussed the ongoing NGSS adoptions and professional development ongoing within OSPI and the ESD's and Districts, The Science Fellows Program and WSTA Activities. The NSTA leadership is very happy that Washington State is a leading state and WSTA is a leading Chapter in Science Education and NGSS adoption. They pledged their support to help us in our efforts to coordinate among STEM and educational organizations such as WA STEM, Battelle, Laser and OSPI.

4. Joint Membership for WSTA and NSTA is up and running!

We have finalized the plans for joint membership at a steep discount, in NSTA and WSTA. All people can go to www.nsta.org and go to membership, then joint state membership and Washington State. You can join as a new joint member or renew either WSTA or NSTA membership or both. The total cost for 1 year is \$89, a \$20 discount for NSTA and \$5 for WSTA. It is a great deal and gives you connections to all the deep NSTA resources as well as WSTA professional development, The Journal and the Annual Conference.

Go to www.nsta.org and join up or renew today!



WSTA Conference 2018

3-Dimensional Learning in the Tri-Cities

October 19, 20, 21 2018
4 Points Sheraton Hotel & CC,
Bellingham, WA

Come to Bellingham for deep, 3-Dimensional Learning in the NGSS

Engage in fewer, more in-depth, STEM-Certified, 3-D workshops, specifically organized to progress through K-12 in Physical, Life and Earth Sciences fully encompassing Cross Cutting Concepts and Science and Engineering Practices with NGSS-certified teacher leaders.

KEYNOTE SPEAKERS

Dr. Ken Wesson, *Delta Education*
Neuro-Cognition and the
NGSS-deep learning

Ms. Phyllis Harvey-Buschel,
MESA-UW
Science for all Students-Access and Equity
Perspective
Field Trips -- Great Exhibitors – One
comfortable venue

See the website at www.wsta.net

Follow us on Twitter (**@WSTA-Sci-Teach**) and Facebook (**WSTA**)

Conference Chair (Workshops/Content) Roy Beven rbeven@fidalgo.net

Conference Coordinator (logistics/support): John McNamara mcnamara@wsu.edu

Exhibitor Information: Mike Allen wstaexhibithall@gmail.com



Roster of the Board

Executive Committee

Past President	ROY BEVEN	rbeven@fdalgo.net
President	ANDY BOYD	boydscience@gmail.com
President-Elect	JOHN MCNAMARA	mcnamara@wsu.edu
Treasurer	KAREN MADSEN	madsenkp@gmail.com
Recording Secretary	DANA MARSDEN	marsdee@gmail.com
Executive Secretary	JUDY SHAW	shaw9@comcast.net

Regional Representatives

Region 1 (ESD 101)	JEFFERY WEHR	wehrscience@gmail.com
Region 2 (ESD 123)	MARY WISE	mary.moore@rsd.edu
Region 3 (ESD 171)	WENDY WYTKO	wytkow@mlsd161.org
Region 4 (ESD 105)	MIDGE YERGEN	yergenm@wvwd208.org
Region 5 (ESD 189)	JONATHAN FROSTAD	jfrostad@gmail.com
Region 6 (ESD 121)	DON PRUETT	don_pruett@sumnersd.org
Region 7 (ESD 113)	CARMEN KARDOKUS	carkar@flamingmoon.com
Region 8 (ESD 112)	MARK WATRIN	watrin.mark@battlegroundps.org
Region 9 (ESD 114)	BRANDI HAGEMAN	bhageman2012@gmail.com
Region 10 (ESD 121)	LISA (CHI) CHEN	chili_888@yahoo.com

Appointed Positions

Awards and Scholarships	COCO CARLSON	ccarlson@portangelesschools.org
Business & Industry	DAVID REID	reidpse@hotmail.com
Professional Development	LOIS SHERWOOD	lolo.sherwood@gmail.com
Clock-hour Designee	CAROL SANDISON	carols@solidnet.com
Equal Opportunities in Science	PHYLLIS HARVE-BUSCHEL	pgharvey@uw.edu
Member Services Coordinator	JOHN MCNAMARA	mcnamara@wsu.edu
OSPI Science Representative	ELLEN EBERT	ellen.ebert@k12.wa.us
Higher Ed Representative	VANESSA HUNT	huntv@cwu.edu
ESD Representatives	MEHELLE LALANNE	mechelleL@ncesd.org
	TAMI SCHRADER	tschrader@esd101.net
	MICHELLE GROVE	mgrove@esd101.net

WSTA Regional Map of the State



Region 1: Jeff Wehr (Odessa) wehrscience@yahoo.com

Region 2: Mary Wise (Richland) mary.moore@rsd.edu

Region 3: Whitney Wytko (Moses Lake) whitneyw@mlsd161.org

Region 4: Midge Yergen (Yakima) yergenm@WVSD208.ORG

Region 5: Jonathan Frostad (Anacortes) jfrostad@gmail.com

Region 6: Don Pruett (Puyallup) don_pruett@sumnersd.org

Region 7: Carmen Kardokus (Olympia) carkar@lamingmoon.com

Region 8: Mark Watrin (Battleground) watrin.mark@battlegroundps.org

Region 9: Brandi Hageman (Port Townsend) bhageman@ptschools.org

Region 10: Lisa Chen (Edmonds) chili_888@yahoo.com

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