



**Next Generation Science Standards &
Climate Science Education Grant**

Summative Evaluation Report

**Prepared by MEMconsultants, LLC
July 2019**



MEMconsultants LLC
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Introduction

About IslandWood

Mission

IslandWood’s mission is to provide exceptional learning experiences that inspire lifelong environmental and community stewardship.

About the Project

With grant funding from OSPI, IslandWood offered intensive and varied professional development to teachers to facilitate implementation and integration of Next Generation Science Standards (NGSS)-aligned practices that center on their own communities. IslandWood offered tiered options for support. This project leveraged IslandWood partnerships with the Puget Sound and Olympic ESDs.

Workshops

The following workshops were each offered three times during the 2018-19 academic year. They were offered as a training series for teachers to attend but many teachers attended only one or two.

1. Science Practices in the Schoolyard
2. Community Mapping with Crosscutting Concepts
3. Engineering Solutions for Your Community
4. Understanding Urban Water Systems

School-Based Supports

A smaller set of teachers asked for school-based supports and were often joined by teachers at their school who had not attended any workshops. All teachers in this group attended a planning session at their school with an IslandWood staff member to think about how they could use their schoolgrounds for teaching. A smaller group also had an IslandWood staff member join their class for an outdoor lesson.

About the Evaluation

The purpose of this evaluation was to understand the initial impact of workshops provided by IslandWood in the first year of implementation of the Next Generation Science Standards & Climate Science Education Grant. In addition to this summative evaluation report, IslandWood was also provided with a brief interim report after the first round of survey responses. IslandWood was able to use this information to inform the remainder of the implementation.

Evaluation Questions

The evaluation focused on whether and how teachers felt that the training and technical assistance delivered by Islandwood influenced their teaching practices and their understanding of the Next Generation Science Standards (NGSS).

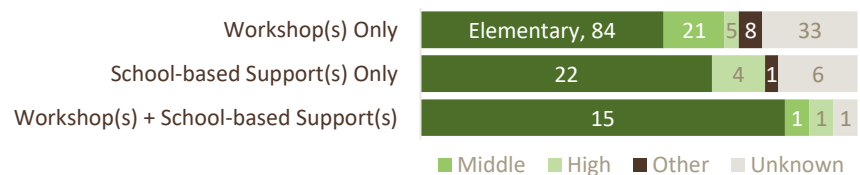
In this first year of the project, the evaluation focused on the short-term impacts on teachers:

- Percentage of teachers who report increased skills and confidence in their ability to integrated NGSS-aligned practices in their classroom.
- Percentage of teachers who report implementing one or more related lessons with their students.
- Difference in measured indicators of success among participants based on level of engagement.
- Teacher-reported improvements in their ability to meaningfully engage students in science, address science standards, and expose students to STEM uses in everyday life.

Methodology and Response Rates

MEMconsultants worked with IslandWood staff to administer surveys to workshop participants twice following their attendance at IslandWood-led workshops. Teachers received initial surveys a month or two after attending workshops, and again at the end of the school year. Both surveys included rating scale and open-ended questions focused on impact on teacher knowledge, skills and confidence gained, implementation of practices introduced at the workshops, and teacher self-report of the most salient impact of the experience.

Engagement Level	# of Teachers	Survey Responses
Workshop(s) Only	151	71 (47%)
School-based Supports Only	33	16 (48%)
Workshop(s) + School-based Supports	18	15 (83%)



Key Findings



99% of teachers report that they are comfortable taking their students outside after the workshop.

Only 73% of the teachers agreed they were comfortable with taking their students outside prior to the workshop.



I used to think... that taking students outside would be a difficult task.

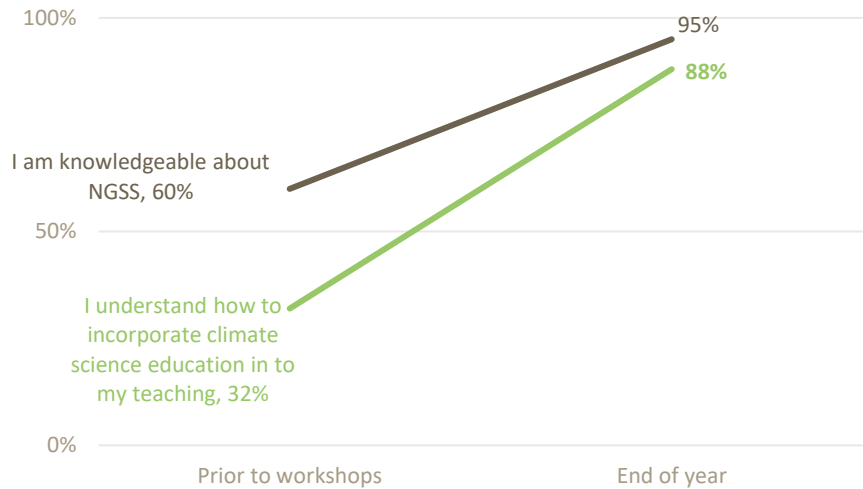
Now I think... even though the management might be difficult, **the students were exposed and learned from learning walks.**

I used to think... I didn't have time for science and I couldn't manage it with 24 kindergarteners.

Now I think... I can incorporate science into other subjects and **I can even take kindergarteners outside!**

Teachers increased their ability to integrate NGSS-aligned practices in their classroom.

Teachers reported the greatest growth in their understanding of how to **incorporate climate science education in to their teaching.**



In a retrospective pre-post survey, only 32% of teachers agreed or strongly agreed that they understood how to incorporate climate science in to their teaching. At the end of the school year 88% of teachers agreed or strongly agreed that they understood how to do this.

Teachers explicitly named increased skills to address Next Generation Science Standards in their classroom.



I used to think... that the NGSS standards were difficult to understand.

Now I think... **I am beginning to get the hang of it.**

I used to think... that the NGSS were overwhelming and cumbersome to integrate.

Now I think... that **I can** take an area of science and **implement NGSS easily** due to my hands-on experience of teaching it and attending trainings that count.

I used to think... NGSS we not being taught in my district from elementary.

Now I think... they are.



Now I think it is more important than ever to think, teach and learn through science. ~ 2nd grade teacher

Some of the most valuable ways to extend my students scientific understanding and learning can be in studying phenomena occurring outside our classroom!
~ Seattle Public Schools Employee

About the Qualitative Analysis

Teachers responded to an open-ended prompt designed to assess the most salient take-away from their participation in this project:

I used to think...

Now I think....

This survey item was included to complement use of likert-style ratings of impact (which are necessarily leading as they list the intended impacts, often resulting in positively skewed results). Responses were clustered by emergent theme and the most popular themes are described in this report:

1. New ideas for how to enhance science instruction, including integration with other subjects
2. Positive impacts on student engagement with science
3. Increased teacher confidence in teaching science and associated motivation
4. New strategies for connecting STEM with students' everyday life

Teachers report greater confidence in their ability to integrated NGSS-aligned practices in their classroom.

Over 1 in 5 teachers emphasized **increased confidence in teaching science** and associated **motivation to teach science** as their personal greatest take-away from their work with IslandWood.

I used to think.... taking students into the field to do science was daunting.

Now I think.... **taking students into the field to do science is doable.**

I used to think... that science was challenging to teach as there is so much that I didn't know about science.

Now I think... that teaching science is a process, that there are methods of teaching it and investigation questions that **I can learn with my students.**

I used to think.... science was a pain to teach and difficult to manage.

Now I think.... **science** can be managed and **can be fun for teachers and students.**

Teachers noted that they became more motivated to teach science, despite the many competing demands for their focus.

I used to think.... I didn't have time to thoroughly teach science

Now I think.... **I need to teach [science]** regardless.

I used to think.... science was hard and overwhelming to teach on top of all the other things I needed to get in during the day.

Now I think.... of ways to incorporate Science into what I am already teaching and that **Science is FUN!**

I used to think.... teaching science wasn't my forte.

Now I think.... **I love teaching science.**

I used to think.... That science is important for our students to develop their knowledge about the world.

Now I think.... That **science is vital for our students** to make sense of the world we live in.



Approximately **1 out of 10** teachers explicitly cited **integration of science with other subjects** as an instructional strategy they were implementing as a **result of these workshops**.

It is actually a really good segue to support science by bringing more of the literature in that supports our units. ~ 7th grade teacher

[Science] can be integrated with cross-curricular subjects, including current events and issues students are passionate about.
~ 4th grade teacher

Science should be taught throughout the day in an interdisciplinary manner.
~ 4th grade teacher

I can incorporate [science] into other subjects. ~ 4th grade teacher

Teachers describe utilizing new science instruction practices in their classroom.



37% of teachers described gaining specific new ideas of how they can enhance science instruction.

I used to think.... science kits were the only way to teach k-2 science.

Now I think.... **there are lots of other ways [to teach science]!**

I used to think.... science had to be done in the classroom with a step by step experiment.

Now I think.... **science opportunities are all around us.**

I used to think.... I had to stick with district-provided science kits.

Now I think.... **I can incorporate meaningful science experiences by bringing local science learning to my classroom.**

I used to think.... Science was something I did not have time for or the knowledge to teach.

Now I think.... I can incorporate it into different learning areas and **I have lots of ideas what to teach** and how to manage my students.

Many teachers described an expanded understanding of what science instruction is, creating more opportunities to incorporate science instruction throughout the day.

I used to think... science was just studying facts and doing experiments.

Now I think... **science should be studying relevant facts and happenings** by doing research, observations and experiments.

I used to think... science had to be a dry, compartmented discipline.

Now I think... **science can be dynamic and apply to students' lives.**

I used to think... kids needed to understand the scientific method.

Now I think... the **science and engineering practices are more authentic to the way scientists work.**

I used to think... Engineering had to be about physical structures.

Now I think... **Engineering isn't limited to solving problems only with physical structures.**

I used to think... that I had to teach the scientific process with every lesson.

Now I think... of **teaching science as asking questions and making observations** of the world around the students.

I used to think... Science was a series of steps.

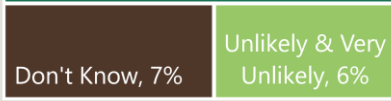
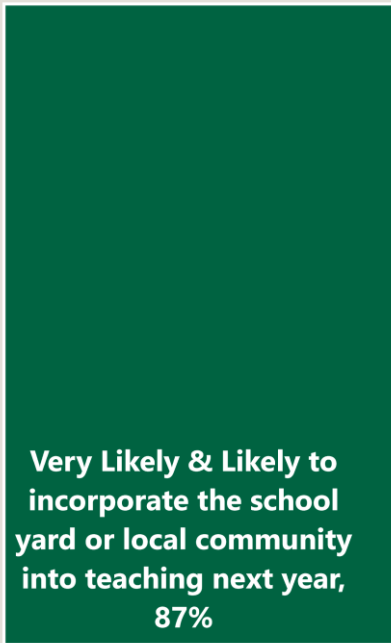
Now I think... of **science as inquiry.**

I used to think... that presenting factual information in a logical, connected sequence was enough to effectively teach the material.

Now I think... **students need instruction that incorporates more modes of learning:** with emphasis on science & engineering practices, data collection and analysis, information communication/exchange, etc.

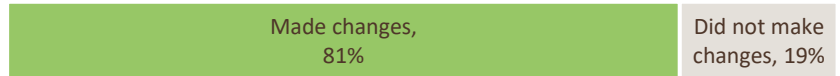


Most teachers intend to incorporate their schoolyard or local community in to their teaching next year.



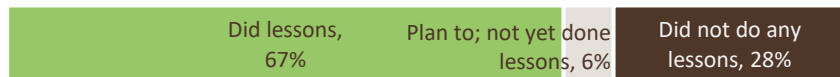
Teachers report implementing what they learned with their students.

81% of teachers report making changes in how they taught, based on the workshops and/or support they received.



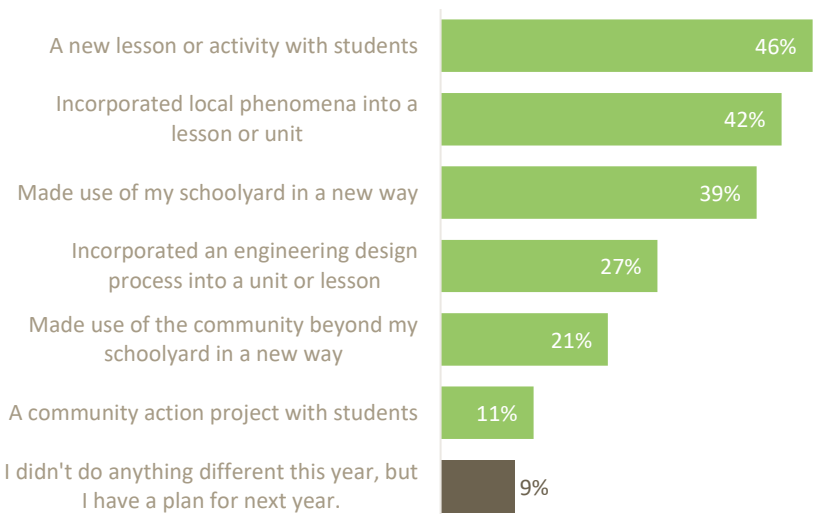
67% of teachers report doing lessons with students.

6% of teachers report that they haven't yet done a lesson, but are planning on it. 28% did not indicate that they planned to do any future lessons.



Teacher perception of how a lesson or unit is defined may explain the discrepancy between the proportion of teachers who report making changes in how they taught versus those who report doing lessons with their students.

Of all the science instruction strategies emphasized in the workshops, teachers were most likely to do a new lesson or activity with students or incorporate local phenomena into a lesson or unit.



At the end of the school year, 9% of teachers reported that they didn't do anything this year, but intend to do so next year.



Teachers described how they use new instructional strategies to increase student engagement in science learning.

1 in 3 teachers initiated feedback that the impact of the new instructional strategies on **student engagement** in science learning.

Students are much more engaged in a meaningful way when science is relevant to the world around them. My students were interested in the science concepts taught this year and are looking beyond what they learned in school and bring ideas and stories to me. ~Middle school teacher

The students were more engaged. ~ 7th grade teacher

Student engagement and follow through was great!

~1st grade teacher

Teachers report increasing **student curiosity** during science instruction.

I used to think... science concepts were mostly taught in a classroom setting.

Now I think... **students' curiosity can be sparked** and science concepts can be taught by exploring community assets (places and people in our neighborhood).

I used to think... I had to front load students with concepts before going outside.

Now I think... it's better to explore outside first, and then **use students' curiosity** and questioning to drive instruction.

I used to think... it had to be in its own timeslot

Now I think... it can be integrated with cross-curricular subjects, including current events and **issues students are passionate about.**

I used to think... I had to explain a lot.

Now I think... **I need to show students the world and help them to follow their questions.**

I used to think... you had to teach a lot of science concepts before going outside.

Now I think... **you can go outside right away to build curiosity** and questions, followed by researching back in the classroom.

Teachers report increased ability to **support students to meet science standards.**

I used to think... I had to follow provided curriculum to the tee.

Now I think... that **I can use resources around my school yard to teach grade level and state required concepts** with higher student engagement.

I used to think... I wasn't as clear on the standards and how to put them into practice.

Now I think... **I have a better understanding of the standards and have put more into my practice.**

I used to think... Meeting the standards got on the way of making science interesting.

Now I think... **Creative teachers can meet the standards and make science fascinating.**

I used to think... using science kits and focusing on a big idea that incorporated standards was enough.

Now I think... **starting with a phenomenon and having students help shape investigations** while using the standards is better.



My students, as well as myself, participated in more STEM activities this year than ever before. ~ 2nd grade teacher

The Engineering Design Process is an engaging and proactive way to teach science. Students feel empowered to make positive change as a result of our scientific investigations and they appreciate being able to "do something" about the problems they are learning about in our ecosystem. ~ 4th grade teacher

I was able to present and facilitate activities with my students that connected them directly with a real-world problem here in Puget Sound and prompted a group of my students to action. ~ 5th grade teacher

Teachers describe how they use new strategies to make STEM relevant for students.

Teachers describe new instructional strategies that help students see the **connection between STEM and their everyday life.**

I used to think... I used to think I had to teach straight from the book about topics that my students had no connection with at all.

Now I think... that I **can help my students to find and experience the science ideas that directly relate to them and their community.**

I used to think... I could just open the kit that is provided and teach

Now I think... it is more important to start with a driving question and allow the students thinking and questioning help drive the process. I also see the ways in which I **can incorporate not only conceptual and physical models but also real-world examples** and hopefully real-world physical examples in the learning process.

I used to think... science had to be a dry, compartmented discipline.

Now I think... **science can be dynamic and apply to students' lives.**

I used to think... that Puget Sound's pollution was mainly industry's fault.

Now I think... that Puget Sound's pollution is predominantly impacted by residential uses and that **my students can be empowered to change that.**

I used to think... I needed to follow science curriculum exactly as it is stated.

Now I think... **I can incorporate local environment into the curriculum we are studying.**

I used to think... that science came in a kit with a script.

Now I think... that **science is found in our daily life.** It doesn't have to be boxed and I don't have to know the answers.

I used to think... I could just follow the lessons in our science kit, but they are really out of date.

Now I think... That I **can supplement our science kits with local phenomena that is interesting to the student.**

I used to think... that there was a disconnect between the ideas I was teaching in the classroom and students' personal life.

Now I think... that I **must adapt lessons to relate to students, using projects related to their communities to improve learning.**

I used to think... science was difficult to teach and make relevant to students.

Now I think... **science is fun to teach, engaging, and helps produce inquisitive, critical thinkers who are going to change our world for the better some day!**

I used to think... it is too complicated to have open-ended questions.

Now I think... **it is much more engaging for students to ask questions about their environment around them.**



Teachers who received school-based support reported that they found the additional support from IslandWood to be valuable in supporting on-site implementation.

[What felt most successful was] walking the schoolyard with IslandWood staff to look for ways to incorporate what we have here into a lesson with students.

~ K-5th grade teacher

I think [IslandWood does] an amazing job and I LOVE the way that you are willing to come to our work site! Makes things so much better for a tired, overwhelmed teacher!

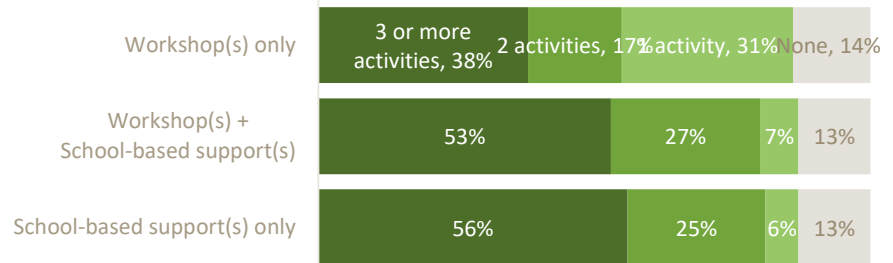
~ Kindergarten teacher

Continue doing what you're doing! The planning sessions are a critical part of implementing the concepts introduced in the professional development classes. ~ 4th grade teacher

The at school visits are great. That way, real help can be given for the actual space available. ~ 3rd grade teacher

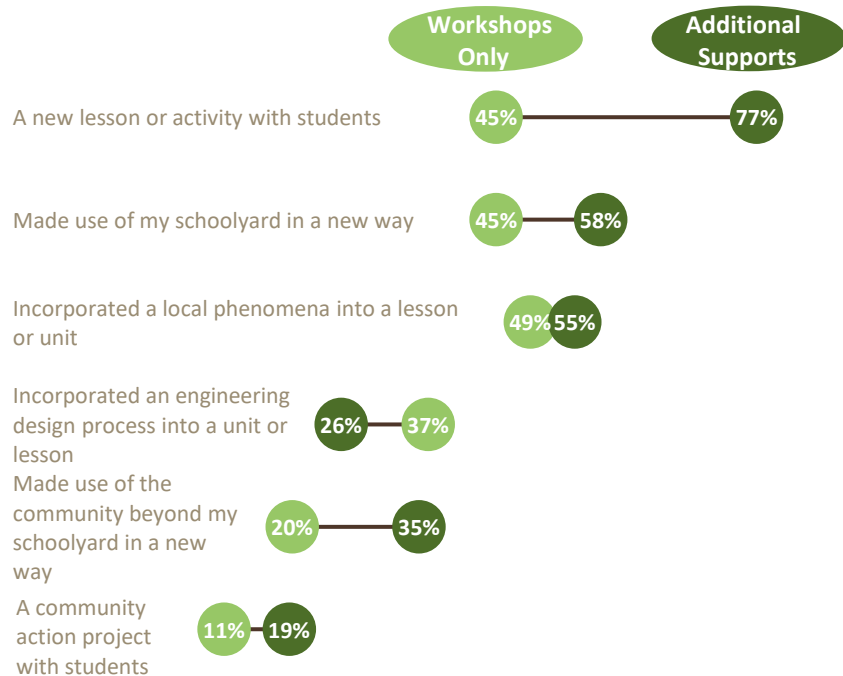
Teachers who received greater support from IslandWood were more likely to implement.

Teachers who received focused, school-based support reported doing more climate science activities with their students. 81% of teachers with who received school-based support(s) report doing two or more activities in the class as a result, compared with 55% of those who participated in workshops only.



Teachers who received more support were more likely to implement almost all types of activities in their classroom than those who only attended the workshops.

77% of teachers who received school-based support(s) report doing a new lesson or activity with their students; only 45% of teachers who only attended a workshop report the same.



The only activity that workshop-only teachers were more likely to do than those who received school-based support was incorporating an engineering design process into a lesson or unit.

Conclusions and Recommendations

These workshops are awesome and I recommend them to all of my colleagues!

~2nd grade teacher

I would say that the workshops were extremely valuable! Excellent resources were provided and made available for future use. Teachers got to try out activities and prepare additional resources in the workshop setting by collaborating with other teachers. ~4th grade teacher

It was one of the best science professional development I had in my teaching career. ~4th grade teacher

If you have no prior NGSS training or ambitious science training, this program is an excellent introduction. ~Middle school teacher

This end of year one evaluation provides evidence that the workshops and associated support offered by IslandWood meaningfully impacted teacher confidence, skill and instructional practices associated with NGSS.

- Teachers were 2.75 times more likely to report understanding how to incorporate climate science education in their classrooms after the workshops and associated support.
- Four out of five teachers in this evaluation report making changes in how they taught based on the workshops and support they received from IslandWood.
- 99% of teachers report that they are comfortable taking their students outside after the workshop.

Teachers described a variety of desirable impacts of their new instructional practices on their students.

- 1 in 3 teachers emphasized the impact of the new instructional strategies on student engagement in science learning.
- An emergent theme resulting from qualitative analysis was teacher description of how the new practices helped students see the connection between STEM and their everyday life.

While some teachers described how they could use the new practices to address science standards, none described an observable impact on success towards this end. Once teachers have had more time to implement new practices and observe the lasting impact on students, further evaluation should explore:

- Percentage of participating teachers who report their students had an increased engagement with science.
- Percentage of participating teachers who report that lessons implemented were effective at preparing students to accomplish science performance expectations.
- Percentage of participating teachers who report that their students have a better understanding of how STEM can be used in everyday life.

The most common teacher-reported barrier to successful implementation in the classroom relates to their packed instructional schedules and limited time for planning. Teachers, especially those at the elementary level, consistently report that the amount of time during the school day focused solely on reading and math instruction, by mandate, results in science instruction consistently being an overlooked or abbreviated subject. Teachers at all levels recognize that limited planning time prevents them from fully implementing many of the ideas they brought from the workshops. Future workshops could incorporate planning time, and IslandWood should continue to offer on-site planning support that made a meaningful difference in implementation.