

The Nooksack Valley Science Program

Science instruction has developed at the Nooksack Valley School District over the past five years. As we examine where we are today, we are fortunate to have the partnerships to move science forward. With a district focus on literacy and math, we must attribute much of our science success to our outside partnerships of LASER, the Northwest LASER Alliance, North Cascade Olympic Science Partnership (NCOSP), and the addition this year of our OSPI Science Coaching Grant. Without the support of the district science coordinator funded through our LASER grant, leadership and facilitation of the science program would have been limited. We've seen success at the middle and high school levels, and our WASL scores are beginning to reflect our improvements. We've implemented long lasting changes that are improving academic achievement through our science program.

Five years ago our district wrote its first science plan at the LASER Strategic Planning Institute (SPI) that has guided our work. To implement a complete science program, we are continuing to develop and improve in five areas: curriculum, professional development in instruction, assessment, materials support, and administrative and community support.

Curriculum

The adoption of an inquiry-based curriculum has significantly helped our programs. We began focusing on science in our elementary buildings about six years ago by phasing in Full Option Science System (FOSS) Units. The middle school followed, and over the last three years has adopted two Science and Technology for Children (STC) kits at each grade level. In 2007-2008 our High School adopted Biological Sciences Curriculum Study (BSCS) Level I, and this year is implementing BSCS Level 2. In addition, Physics and Chemistry are piloting new materials as well. LASER funding through the LASER Alliance at ESD 189 has supported the purchase of the curriculum adoptions.

The materials brought a renewed interest in improving instruction. During the 2006/2007 school year, the high school team was very discouraged. The conversations were focused on the problems of the students, lack of support, and no materials. Classroom walkthroughs by district and building administrators noted disengaged students and many discipline issues. After implementing the BSCS Level I materials, teachers reported that students enjoyed the new materials and were engaged in the work. The building commitment led by the principal and the science coordinator helped to provide not only new kit materials, but also to upgrade conditions in the labs as well. New microscopes and probes were purchased, and the high school labs were brought into the 21st century. Our work last year showed significant progress in student engagement, teacher commitment, and building/district support.

Our middle school began the integration of their new materials three years ago. The STC materials brought emphasis to science instruction with a changed approach to an inquiry-based program. This led to increases in the amount of time that science is taught with an average amount of fifty minutes per day as compared to far less

previously. Currently, the teams are working to see where there are gaps in meeting the standards with only two units at each grade level. They plan to build lessons to supplement the STC materials to meet the Grade Level Expectations (GLE's).

The adoptions have not solved all of our challenges. Our middle school teachers are responsible for both math and science. Since math is a competing initiative, it has been a challenge for teachers to give equal time to the science curriculum, as well as splitting their professional development time devoted to each subject. The science coordinator funded through LASER has helped maintain the urgency to continue the science focus for curriculum adoption, professional development, instructional emphasis, and student achievement. Without the LASER support, science would not be a focus.

With a new curriculum in place, teachers have struggled with pacing, implementation of the units, and teaching the content with fidelity. As we worked on identifying the gaps that the tenth grade students are showing this year, it occurred to us that this particular group of students has had new science materials introduced to them almost every year of their educational experience. While excited that we have inquiry-based materials in place, it is unknown what the impact is of having teachers learning how to teach an inquiry-based program while students are struggling to achieve. These issues are the focus of our newly updated science plan and issues that continue our work.

Professional Development and Instruction

Adopting new science materials was important, but the need for professional development was also necessary. All teachers received initial-use training on their materials, but the one or two days just familiarized the teachers with the content of the kits. In the spring of 2007, the teachers and administration conducted science walkthroughs at both the middle and high schools. At that time, it was apparent there was a varied level of instructional skill among our teachers. Our middle school teachers had been working on their math instruction through Teachers Development Group and the Mathematical Best Practices, though not all of the skills learned were transferred to the science classrooms. Our high school teachers had not participated in this training, and had not started to examine their own instructional skills.

Last year, through the support of LASER, a Teachers Development Group trainer worked with both our middle and high school teams on the Best Practices in Science instruction. Much of the focus was on the use of the teacher and student reflection tools and working to bring rigor to their classrooms. Through the help of the LASER grant and NCOSP, we had support to plan team meetings and the monthly training sessions. The middle school and high school teams became a functioning professional learning community (PLC) and worked together to improve classroom practices. Without the support of the science coordinator and the building administration, the work would have stalled as they worked side-by-side with the PLC teams. Teachers began talking science with each other. The Best Practices training included classroom visitations by the middle and high school teachers, the science coordinator, and building and district administrators. The visits showed the instructional skills of the teachers improving, and student engagement had increased. Teachers reported the science knowledge of the students was also improving and they understand the scientific process better.

The middle and high school teams benefited from working together. The middle school teachers no longer emphasize math over science, and they listened to the concerns around achievement and vertical alignment from the high school teachers. As part of our PLC work, we began to look at the vertical alignment of the curriculum and to see if our current program meets the students' needs. The high school team saw that middle school students can handle a rigorous curriculum, and it increased the expectations for the older students. The teams observed teachers who were reflective in their practice and discussed how to take a good lesson even further. The conversations focused around teacher practice and not about the problems with the students or other issues that were beyond their control.

Fred Grant (middle school) and Scott Nunamaker (high school) are furthering the work this year by working side-by-side with their colleagues as science coaches. Our coaches are learning the leadership skills necessary to lead the work once the grants have ended, and we no longer have a science coordinator. Because we have a LASER project coordinator, the coaches also have support for their leadership. By working with all levels from the administration to the new teacher, our science program can be sustained. Watching the growth of our coaches in their move from thinking only about their work to sustaining the building and district work is exciting.

Beside the imbedded work during the planning times, our science teachers have four additional days for professional development. In December, our middle school teachers worked on formative assessments. They are using the *Understanding by Design* format to identify the essential questions for the kits. A challenge they've had is that three of the six teachers are new to the building, and all in their first years of teaching. While it's exciting to bring in staff ready to grow, it is challenging when they are struggling to teach both new math and science curriculums. Our science coach is supporting them by doing demonstration lessons, supporting the content knowledge, and pulling the grade level partners to support their collaboration. The next professional development session, with the support of LASER, will bring Roy Beven, formerly from OSPI, to work with all of our grade 6-12 science teachers on the "application" piece of the standards. This came from an analysis of our WASL scores and the teachers saying this was the area they struggled with the most in their instruction. The conversation will also be around academic rigor of lessons.

Materials Support

When we first adopted the new science materials, we did not have the option of becoming part of a cooperative. While it is a plus for our teachers to have access to the materials at all times, it has been a challenge to figure out workable systems for the management and refurbishment of the materials. With the increase of consumable materials, it is also a budget item each year. As the teachers get to know the units, they are better able to estimate the ongoing expenses these programs will cost. Having our professional development supplemented by our LASER grant has helped us to finance the materials. We are committed to maintaining the kits as needed. It has taken us almost two years to figure out a working system, but that system is now in place. Teachers have access to their materials and a plan is in place for refurbishment. The district has committed to providing the funding to maintain the kits.

Assessment

Our WASL scores have improved. In 2005-2006, Nooksack Valley High School had 26.1% of our students pass the science WASL. Last year we had 47.6% of the students pass. Similar results are found in the middle school where 38.3% of the students passed in 2005-2006, and last year we had 58.7% of the students pass. Though we are very excited about these scores, we know that this is only a small measure of our progress.

In December, our high school completed a building walkthrough where they were looking across the board at the rigor of the tasks and the student level of discourse. The teachers used a measure to identify how time was being used in a ten-minute snapshot of the classroom. The results indicated that the science teachers and students spent about 70% of their time on lower level tasks, such as, observing, describing, and defining. Only about 15% of the time was spent on evaluating, applying a principle, predicting, or hypothesizing. These results were similar to the average of all departments. They are now working on a plan to improve the rigor of their lessons and of student discourse. Our upcoming science professional development session will have rigor as a focus. Other measurements of progress include tracking the "F" data, especially with freshman students. This number has decreased in the past two years.

Challenges still remain. We continue work on finding effective ways to remediate for our students still not meeting the standard. Competing initiatives will always be there, but high expectations, rigorous curriculum, and reflective teachers are all part of our solution.

Administrative and Community Support

Over the last five years, administrative and community partnership support has strengthened. Through our LASER grant and work with the Northwest LASER Alliance and NCOSP, science has been on the administrative radar. Because of the LASER grants we've been able to provide quality professional development in science, even during tough budget times. Two years ago our high school teachers were citing a lack of administrative support as a barrier to their work. When the science committee met, the principals were not involved. Now, because the PLC's have been developed and are meeting on a regular basis, principals are involved in the work and teachers feel the support. Science is unique in the partnerships that have been built outside of the district. No longer are we isolated in the work we are doing.

In short, the LASER grant has helped us across the scope of science work. The comprehensive plan has been our roadmap, and a subject that is often forgotten has been brought to the front. Our science classrooms have solid inquiry-based materials. The teachers not only received initial-use training but also have now had two years of quality professional development around instruction and assessment. Many of the barriers that

stood in our way two years ago are now gone. We are working toward building internal capacity and leadership. LASER has helped us meet our goals and continue to grow.