

The Washington State Story of the BSCS National Academy for Curriculum Leadership

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For many years, school districts throughout Washington State have participated in LASER, focusing on science curriculum reform in grades K–8. Over time, high school teachers and administrators began to ask, “Where is the LASER for us? Where is support for science reform at the high school level?”

Just as the interest in high school science reform was gaining momentum, the leadership of Washington State LASER discovered the Biological Science Curriculum Studies’s (BSCS) National Academy for Curriculum Leadership (NACL), funded by the National Science Foundation (NSF) and developed by BSCS. The NACL, a three-year professional development initiative, was established specifically for science reform at the high school level, grades 9–12.

After about a year of conversation and planning, BSCS and Washington State LASER, with primary funding from the Agilent Technologies Foundation, launched the NACL in Richland, Washington, in the summer of 2004. The first cohort of 15 school districts from across the state established leadership teams and were off and running in the direction of improved science learning for all students and professional development for all science teachers.

The leadership teams have been part of the Academy since August of 2004, beginning with a leadership institute followed by a five-day meeting in November and a two-day meeting in May. Teams are about half-way through their second year of the Academy and have amazing stories to tell about their journey in high school science reform. What follows is the story of six Washington-based NACL leadership team.

The Story of Leadership Team Development in the East Valley School District

By Mark Hummel, Principal

Before our involvement in the National Academy for Curriculum Leadership (NACL), the science department and instruction at East Valley High School could be described in the following way: traditional instruction; individual teachers doing their own thing, lacking consistency and coordination between classrooms; disagreement over standards and expectations for students; frustration over the department’s lack of productivity and inability to see tasks through; disagreement with department decisions (budget); little support or caring for each other; competition for high-achieving students; and a belief that teaching the scientific method or “hands-on learning” was teaching with an inquiry science approach. Given this, it is no wonder that we were assigned the topic of developing team leadership for this presentation.

Participating in NACL has put us into situations in which we have been required to address the critical issues that we otherwise would have avoided. Though it was not easy and it took honesty and time, working through those issues is what has brought us together as a team. Given where we began as a team before NACL, progress in the area of team leadership was going to necessitate some pain.

The development of a science department team at East Valley High School began by developing a mutual understanding about what teaching science with an inquiry approach was and wasn’t. This was learned in two ways, through activities and readings assigned at NACL as well as a decision of the group to complete a professional reading of Douglas Llewellyn’s book *Inquire Within*. We were able to understand quite quickly that our previous understanding of science as inquiry was short of the mark and that implementation would call for some significant shifts in how we went about business in the classroom. Talking about it was fairly easy; doing it was not as simple. At that point, there was concern by most members of the department about how to get training and professional development to help us

learn these new skills. As would be normal, some members were more willing to jump in and try things, while others were more hesitant. While there was some commitment made by all members of the group at that time, others were not willing to make a complete commitment until they observed and experienced this new instructional approach firsthand and, most important, saw how it affected the learning of their students.

East Valley School District had science on the cycle for adoption implementation this year, which pushed us to use the AIM process last year to select materials. The curricula we chose were Coordinated Science for the 21st Century (grade nine) and BSCS Biology—A Human Approach (grade 10). In retrospect, this push was good, as the implementation this year has raised issues that we were forced to address as a team.

Early in the NACL process, each district team discussed and developed operational procedures. We learned about the change process, effective communication, and shared leadership. We developed protocols for making decisions. Learning about and establishing these procedures on the surface was relatively easy. Using the operational procedures for effective team functioning was a completely different thing for us. This past fall, pushed by our initial attempted implementation and the professional development focus of the fall NACL conference, we were forced to go back to those team operational agreements. In effect, we had to take a large step backward before we could go forward. We rehashed as a group how decisions would be made, how leadership would be shared, how to engage professionally without getting personal, and how we depended upon each other and needed to support each other; most important, the team committed that it could not develop science skills in our students unless it coordinated and worked together. An amazing sidebar is that the facilitation of this blood-letting discussion came from the youngest and most unlikely of team members, which had the impact of strengthening the resolutions made beyond what they would have been had the facilitation come from myself as the lead administrator.

As a team, a list of tasks to be completed this year was developed. This included both curriculum implementation needs and professional development as year two of NACL. We are continuing to study and practice inquiry science at the building level. A key part of our professional development is sharing successes and failures in our own classrooms. On a weekly basis, we are coordinating the curriculum implementation and sharing in lesson development. Finally, we hope to reach out to our middle school staff by providing in-service through a Yakima Valley Science Inquiry Workshop this spring. Our department has a self-developed shared focus of where it is going and how it is going to get there.

The progress we have made in two years has not been easy or without pain, but the benefits to teachers and students has been immense. We have taken great strides moving from traditional “talking head” instruction toward a coordinated team teaching science with inquiry pedagogy that will better prepare our students to be able to “do science.” There is no question that this progress would not have been made without our involvement in NACL and the instruction and guidance of the NACL leaders.

The Story of Selecting and Supporting Inquiry-based Instructional Materials in High School Classrooms

By Bob Sotak, K-12 Science Curriculum Specialist

In spring 2003, Everett Public Schools developed a five-year strategic plan to implement and support a K–12, districtwide, inquiry-based science program. During the 2003–2004 school year, K–8 inquiry-based science materials were adopted. These materials would be implemented over the next three years. An intensive professional development program and an expanded science materials center were included in the implementation plans. The challenge then was to begin the adoption process for the high schools. At that point, each of the four high schools had its own program. In some cases, teachers in the same buildings were using different materials. We had included representatives from the high school to observe the K–8 adoption process and to review the materials, but when it came to selecting

new materials for ninth and 10th grades, there was a sense of wanting to tweak what they had or to develop their own program. The notion of a districtwide program was not well received, to say the least.

The team we brought to NACL in fall 2004 was skeptical of reform-based materials. The NACL Team was part of a larger ninth- to 10th-grade adoption team, and the team members were worried about how their colleagues would respond to such a different approach to teaching. The team returned after the first institute in Richland, Washington, ready to dig in to the adoption process, but still reluctant to step too far outside of the box. By January, using the AIM process, the list of possible instructional materials still on the adoption list was whittled down to one ninth-grade program and two 10th-grade titles. After field-testing the programs in the classroom, there was only one title at each grade level. The biology teachers still were uncomfortable with the selection, but by using an evidence-based selection process, they reluctantly agreed to move ahead with the selection. The day after this decision was made, the technical assistance session was held in Tacoma, Washington. During this time, the team was able to talk with others who were already using some of the materials and had a chance to learn some professional development activities they could use with their colleagues. During the long drive back from Tacoma to Everett, the team decided to become more involved in the implementation training. In May, though consisting of the same people, it was a different team that went to Kennewick, Washington, for the second NACL institute. The team went with a mission: how to implement the new materials. The team members returned to Everett and planned a full day of professional development for all high school science teachers—which it provided at the end of May. For some on the team, it was the first time they had ever worked with adult learners.

The NACL's AIM process provided a context for teachers to look at how students learn and how instructional materials could mediate the learning process. The AIM evidence-based decision process provided a way to break out of the "decision by gut feeling" process used in the past. It has been exciting seeing a group of individuals come together and become a team of leaders. The adopted inquiry-based instructional materials are providing a context for changes in instruction. Teachers are asking for professional development on inquiry, rather than looking for ways to avoid it. Evidence of how the new programs are affecting student learning includes the reports from teachers on how engaged students are in their own learning.

Beginning in February 2006, the NACL leadership team is expanding to include middle school teachers, as we develop a series of Science Inquiry seminars. The seminars will focus on reading in the content area, use of science notebooks, inquiry strategies, and classroom management strategies. As teachers strive to have students be more responsible for their own learning, teachers are becoming more responsible for their own learning.

The Story of Analyzing Instructional Materials in the La Center School District

By Bonnie Lock, Curriculum Director

As the curriculum director in the La Center School District, I personally have been involved with science reform since 1991, but that was not the case for the teachers in our district—especially at the secondary level.

At the secondary level, we began working on investigating science reform during the fall of 2003, but we encountered numerous struggles and a lot of frustration. As the adoption process began, some teachers were ready to implement more of the same. "Give us all the textbooks. We will look them over and tell you which text we want to adopt." The feeling was that all children should be provided the same instruction – that which would provide them the skills to be successful in college. Yet, some realized that many children were struggling and took only the necessary sciences. They wanted more for their students. The same old textbooks were not providing students with the skills they needed for everyday life, and they certainly did not encourage our students to take science electives. The philosophies of how science should be taught and what science should be taught were unfocused and varied widely.

Then the opportunity arose for two of our science teachers to work with the U.S. Department of Energy/Pacific Northwest National Lab and, as a part of that opportunity, become involved in the Washington State NACL Academy along with other districts across the state. The team, consisting of these two teachers, the high school principal, and me, began building a common vision of what science should be at La Center High School. Although one of the goals of our participation in the Academy was to select instructional materials for adoption, we didn't even begin looking at instructional materials until we had experienced first hand the kind of learning we truly wanted for our students. Through the activities provided during the Academy, we were able to challenge each other's beliefs and freely share our understanding of what science should be. It was what we needed to begin to move forward. The tools we used provided us the structure to begin to identify the standard we wanted to set for instruction and learning in our classrooms.

With a growing foundation and a new perspective of the content to teach, we then began to examine the materials. What did we want these materials to provide? What kinds of questions did we want the materials to include? The entire process of materials selection had changed. We no longer flipped through the pages of texts and looked for what we felt comfortable using. The goal was to find texts that really would help students develop inquiry and problem-solving skills. We were now looking for materials that transferred the learning to students. The teacher's role was now that of a facilitator of learning. We knew it had to be more than memorizing facts.

As the process unfolded, we enlisted the assistance of the rest of the high school science teachers. Through the process, a common vision and focus among all teachers were created. A rubric was then created that identified key elements we felt were essential for the materials we would adopt. The materials had to be more than a reference for science vocabulary. We were looking for materials that were based on sound instructional design based on research.

We are a long way from completing the process, but the process is not nearly as overwhelming. Even though many publishers were willing to provide us with examination materials, reducing the options to a manageable number has had much less of an impact. By using the standards we set, we have been able to eliminate all but a select few. It will be these that we will thoroughly examine to make our final selection.

So what will happen during the implementation of these materials? What about the professional development? Reform materials do require teachers to approach the teaching of science differently. How can we support this change with our Board and community? First, a tremendous amount of professional development has already been completed. The AIM (Analyzing Instructional Materials) process has done that for us. Teachers and administrators involved in the process have developed a better understanding of the necessary content to be covered and how to assess the level of understanding of that content. Although we understand more professional development will be needed, it will be more than the one-shot, before school workshop with the publisher. Teachers will be working collaboratively throughout the implementation process to examine their own teaching as well as student learning. The professional development will not stop when school starts.

Finally, from my perspective as the district curriculum director, I can now feel confident that we are doing the best we can for our students. I feel confident that the materials we select will be the best available. We will have the research and data to support us. It's based on more than quality of print or gender equity. Will we need to make adjustments? Will we need to make some changes? If we don't and continue to do what we have always done, then we have gained nothing. Yet, I feel confident we will change – for our students – we will continue to make changes and we will be better for it.

The Story of Designing a Professional Development Program in the Richland School District
By Ann Autrey, High School Science Teacher

Where were you as a science leader, school, or district before joining the NACL?

Before NACL, I was a science teacher interested in being a part of a reform effort, but there was no organized reform movement in the district. I knew of other science teachers who were “reformists,” and occasionally we would talk about our individual efforts of reform in the classroom. The only leadership roles for a high school science teacher in the district pre-NACL were being a department head and being part of the curriculum adoption committee.

Before NACL, the three high schools in Richland operated as separate entities with little communication between the science departments. The only time the science departments met together was for the curriculum adoption every seven years. Our last adoption was three years ago. Within the departments, the management process was to maintain the status quo with as little disruption to the department as possible.

The district played a low-key role in science reform before joining NACL. The district provided funds and substitute time for teachers who wanted to attend regional National Science Teachers Association and Washington Science Teachers Association meetings. Generally the same group of teachers, mostly those interested in reform, attended those meetings. On occasion, the district sponsored a technical training for the science teachers after the curriculum adoption. While the Richland School District strongly supports the reform movement in science education, there was no organized effort to help teachers make curriculum changes. For example, in our district calendar, there are three dates available during the school year for district department meetings. Until NACL began, those three dates were given back to the high schools for department meeting times and the science teachers did not meet all together to discuss issues occurring districtwide.

What have you and your team learned about the design of professional development (PD) from your participation in the Academy?

For most of our team, professional development design was a learning experience. We were experienced in being a part of some type of PD but we did not have experience in PD design. Through NACL, our team came to realize the complicated nature of promoting change and the many important factors to planning effective PD. No one wants to design PD that is not going to interest the teachers and that isn't going to provide ongoing support for our teachers. From what we have learned through NACL, our district team has been given the tools to work together to plan our district PD, to meet the needs of our teachers, and to plan for future follow-up PD sessions.

Following our NACL experience, the biggest change in the PD focus for high school teachers is that PD will be planned according to teacher wants and needs. Before NACL, the district PD for science was based on providing technical training or providing money to go to conferences. Now our NACL team, receiving regular input from the other high school teachers, will design the district's science PD. Through the process of having teachers complete concern statements, PD will focus on the topics of most concern to all the teachers. In essence, the NACL program has given our district's team the tools to effectively establish the needs of our district's teachers and ways to address changes that need to occur in our district for PD to be successful and valuable to our teachers.

Our future plans for science reform in our district depend upon some changes occurring at the district level, at the building level, and with each science teacher. Some of the plans our team envisions are the following:

1. Providing a regional PD training this spring to teach teachers how to align their curriculum with the national and state standards.
2. Working with middle school teachers to accomplish a cohesive scope and sequence of sixth-through 10th-grade science standards within our district.
3. Continuing to educate our teachers on the inclusion of inquiry in the classroom.

4. Having weekly late starts so that teachers have a two-hour PD block built into every week for district, building, and department meetings and for professional learning communities.
5. Building professional learning communities so teachers can get help, feedback, and support through tuning protocols, class visitations, and so on.
6. Implementing a curriculum selection process that uses data-driven dialogue and the AIM process.
7. Providing science teachers with instruction in teaching reading in science.

The Story of Implementing Inquiry-based Instructional Materials in the Tacoma School District By Craig Gabler, Curriculum Director

Tacoma School District is currently the second-largest district in Washington State and exclusively an urban district. At the secondary level, the district has 11 middle schools, five comprehensive high schools, and three alternative high schools. The comprehensive high schools all have enrollments of over 1,500 students and are very diverse, by any measure. The story of implementing inquiry-based instructional materials in Tacoma is a bit different from the other districts participating in the BSCS National Academy for Curriculum Leadership (NACL), in that we had begun the adoption and implementation process before the start of the curriculum leadership institutes.

Through the extraordinary vision of our secondary science facilitator, the “inquiry” wheels were set in motion that would guide our adoption. While we did not have the powerful set of tools provided by BSCS, a careful examination of the research on learning, best instructional practices, and exemplary science materials was conducted, and a selection rubric was constructed, materials were examined, and a collaborative adoption decision was made. Through that process, Tacoma adopted Science and Sustainability for the freshman course and BSCS Biology: A Human Approach for the sophomore course. All existing staff were trained on these materials over the spring and summer. Students began using the materials in fall 2003. As with any adoption, not all teachers were on board with the adopted materials, and many still remain that way. This resistance to the adoption is a theme that appears later in this vignette.

Tacoma’s primary motivation for joining the BSCS curriculum leadership academy was the awareness that in-district, secondary leadership needed to be developed in order for the materials to be implemented with fidelity and used effectively with students. The goals of NACL were clearly aligned with what Tacoma Public School’s science leadership saw as essential.

While the focus of the first year of NACL was on the tools and strategies for examining and selecting inquiry-based instructional materials, a task we had already completed, we looked at the tools through the lens of materials clarification and validation. The team recognized that by engaging in many of the strategies in the AIM process, a deeper understanding of the materials and their alignment with the Grade Level Expectations (GLEs) would be possible. In that process, all the participants, who were student-learning oriented, came to a new and better understanding of science as inquiry and how it can affect students in Tacoma. The team saw value in exposing all Tacoma science teachers to these tools as a form of professional development.

A key component of our NACL experience has been the creation of a solid vertical and horizontal alignment of commitment to inquiry science. By “vertical,” we mean that there is involvement and support from the district office all the way to the classroom. And by “horizontal,” we mean we have involvement from most of our high schools. This cross-alignment is critical to sustaining the work. Now more than ever before, the participating classroom teachers feel empowered to actually lead the work and know they are being supported both vertically and horizontally.

In addition to the development of a program elements matrix (PEM), a tangible outcome from the first year of involvement in NACL has been the development and delivery of a very focused Science as Inquiry workshop offered to all secondary science teachers in Tacoma by the NACL team. This

experience not only informed and enriched the teacher participants, but began the process of transforming the NACL team into professional development planners and providers.

Science education reform in Tacoma is going to remain a strong focus as we move into the future. What will change, as a direct result of our involvement in NACL, is how we are going to move into the future. The NACL team has gained a new understanding of the learning needs of adults and how to design and deliver professional development. As a direct result of that new understanding, the support of teachers using our inquiry-based instructional materials is going to take on a new look next year. Planning has begun that takes into account not only where we need to go, but the fact that many teachers are still resisting the new materials, the context in which the work is being done, the resources available, the characteristics of adult learners, and the way professional development will be evaluated. The one thing that is very clear at this point is that Tacoma needs to use a more-sustained, job-embedded model, and one that includes distributed leadership.

The Story of Building from K-8 LASER to High School Reform in the Yakima School District

By Mark Cheney, Science Specialist

Prior to Yakima School District's involvement in the National Academy for Curriculum Leadership (NACL), science at the high school level was taught in a very traditional textbook and lecture format with lab activities used to reinforce topics being studied. The district had Advanced Placement (AP) or International Baccalaureate (IB) classes available at the two high schools to meet the needs of students desiring advanced classes. Enrollment in these classes had been decreasing over the last ten years. Each of the district's high schools was in *school improvement* due to low performance in mathematics and reading. The district felt that the traditional approach to teaching science was not meeting the needs of the district's general student population as evidenced by two things: 1) poor performance on the State Science WASL and 2) the low number of students enrolling in upper level classes in science.

In 1999 the Yakima School District sent a K–12 team to the LASER Strategic Planning Institute (SPI). At the SPI, a district five-year strategic plan for science was written. Upon returning back to the district, the 5-year plan was shared with the district administration, the School Board, and district science teachers. The 5-year plan then served as a roadmap for the K–12 science adoption the following year. Due to lack of availability of inquiry-based science instructional materials at the high school level at that time, the district adopted a traditional text in all science subjects with the exception of biology, where the BSCS Biology—A Human Approach was adopted at just one high school.

The district adopted STC, STC M/S, and FOSS instructional materials at the K–8 level. The district invested the necessary resources to establish the Yakima School District Science Resource Center to provide on-going material support, as well as providing 18 hours of professional development to teachers for each science kit taught at their grade level. Following the LASER model, the first five years of implementation of the district's strategic plan has helped to establish a sustainable, hands-on, inquiry-based program for the district's K–8 students.

In 2003 the district leadership chose to make the high schools a focus of concern. Administration began to carefully evaluate student performance, instruction, and instructional materials. Through the information gained during the previous five years of science education reform work done at the K–8 level, administrators were aware of the changes that needed to be made in instruction and instructional materials to better meet the needs of the district's high school students.

It was during this time that the district became aware of the NACL. The district Science Specialist and Director of Secondary Education saw the NACL as the opportunity to expand the reform work being implemented at the elementary and middle school levels to the high schools. A district team was selected and began attending the academy in 2004. Upon returning from the fall meeting, the NACL Team met and began work on the high school section of the district's strategic plan for science.

Building upon the LASER model and using strategies and research shared at the NACL, the district team has, to date:

- ◆ met with district administration and teachers,
- ◆ used the AIM Process to identify pilot materials for the upcoming high school science adoption,
- ◆ developed a Program Elements Matrix (PEM) for teacher professional development, and
- ◆ conducted initial-use trainings on the inquiry-based materials selected for the pilot program.

Using the skills and strategies gained through involvement in the NACL and the structure provided by the LASER model, the Yakima School District feels confident that the reform work that was begun in the K–8 grades will now be able to expand to impact our high schools in like fashion.

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