

## 2014-2015 AESN Case Study



**School:** Nakusp Secondary    **District:** #10 Arrow Lakes

**Area of Focus:** Student Level

**Inquiry Team Members:** Julia Flesaker and Dominic Raso

**Our focus area:** Integrating Math and Science

**Scanning:** The Science curriculum is changing to focus more on competencies and each student's ability to perform research and reach conclusions. Students in Science 9 have not traditionally generated, examined and then analyzed data their own data. Students are very good at understanding what they are told and finding information on the internet or in a text, but not necessarily coming up with data and conclusions themselves. This Mathematical and Scientific Understandings Inquiry will focus on students generating research data and reaching their own conclusions.

Grade 9 students have a double block of Science and a double block of Math on Mondays and then a one hour block on Thursday for the entire year. The classes on Monday is a long time to focus on only two subjects, but it does provide the opportunity for making horizontal connections and participating in more active, hands-on learning.

The OECD principles supported most by this project were:

- Students' own interests will be at the center of their project.
- They worked together in groups and with community members in some cases.
- They built horizontal connections between math and science.

**Focus:** Will students demonstrate a sustained intellectual curiosity about a scientific topic of personal interest? We selected this focus area because it is important for students to draw connections between science and other subjects. We think that the double blocks gave us an excellent opportunity to try a larger research project.

**Hunch:** Students can now find the answers to most questions on the internet. Information is at their fingertips and seconds away. When students ask their own questions, they need to flex their intellectual muscles. There might be no data available. Students want to be active, especially during the long blocks of Math and Science. Choosing a science project on a topic that sustained their curiosity engaged learners enabling them to do "real" science and provided the opportunity to visualize connections between math and science. Educators helped to focus questions, guided students toward appropriate sources and maintained a constant dialogue with students regarding progress, concerns and successes. But in the end the data was their own and students discovered new information about something that they were interested in.

**New professional learning:** We have always used the Scientific Method unconsciously in class. This project really made us focus on teaching its principles. To help students learn about the scientific inquiry process we did activities around testable questions and then looked at

example case studies involving data analysis. When we conducted experiments leading up to the project, components of the scientific method were highlighted.

**Taking action:** Students did a practice inquiry about some aspect of Space that interested them in December to learn about the inquiry process. The research based inquiries did not work out very well, because not much of the data was hands on, unless a student decided to construct a model. Learning from this December inquiry, we made sure that in May students chose a project with which they were able to generate data, it needed to be measurable. The Mathematics and science instructors met to coordinate our classes and provide opportunities for students. We also arranged for students to enter other classes, particularly P.E. and elementary classes.

Students were given instruction on the scientific method and offered assistance in choosing a topic that interested them. Students were given the option to work in pairs on inquiries that they chose; they had freedom to work with community members in the research process.

**Checking:** The first inquiries that were completed on Space in December, indicated to me the level of support that the students needed was much greater than we had anticipated. Students had never collected data or worked with their own numbers before. We were glad to have done a practice run. Finding workable data about the solar system or space that interested students was not easy and it limited those students not interested in Space. The primary objective we focused on was creating a testable question. Many of the questions students were asking, were either not specific enough to be manageable or we lacked the facilities to generate the information. The second time we did an inquiry, we used the observations and information from the students in my classes to better scaffold the learning and set up the right opportunities, whether that be assisting in connecting them with community members, or coordinating with other teachers, buying supplies or locating equipment. We had students conducting waste and energy use audits of our school, examining local kreek data, or provincial forest fire occurrences over the last five years. They also quizzed our own student body about left or right brainedness and what that meant. Many connections between biology and physical education were made and students tested heart rate in different age groups and gender. One student made a number of different paper airplanes and then set up tests to find the best one. The projects were as diverse as the students. Feedback from students was positive, they were very proud of the work they did and the results of that work and effort were visible. They learned something and would be able to competently set up another data analysis project in the future.

**Reflections/Advice:** Data collection and coordination of community members is very time consuming and requires a lot of flexibility and patience. It was not possible for students to generate the data immediately and in some cases took up to a week to coordinate. May is a very busy time to have a project come to completion. Next time we would aim to complete an inquiry before the end of term 3. Students were empowered by completing their own research and sharing the information that they were experts on with the class. They owned their learning and took pride in their research. Everyone was able to come up with a topic that interested them. We plan to embed at least one data analysis project into all our courses.