

Structured Follow-up Classes

The *Structured Follow-up* classes are part of the two-phase professional learning model adopted by the Rocky Mountain Middle School Math Science Partnership (RMMSSMP). For the first cohort group of mathematics and science teachers, the first phase of professional learning began in June 2005. During the first phase, teachers in this cohort group completed one of the science or mathematics content courses to increase and update their knowledge. The second phase of learning, *Structured Follow-up*, conducted during fall 2005 required teachers to apply their content knowledge in lessons with their own students and then report on their “innovation projects.”

The purpose served by the grant-funded professional learning is to support teachers in providing instruction that engages students and increases the students’ depth of knowledge. Teachers from seven metropolitan Denver districts participated in the first professional learning cycle during 2005. The general reaction of teachers to *Structured Follow-up* is expressed by Aaron Tate, “This program is incredible!”

Walking into these classrooms was an exciting experience! Innovations in instruction that had been cutting edge in the ‘80’s and ‘90’s are being mainstreamed with success and excitement in these classrooms. “Hands-on,” “minds-on,” “inquiry,” “experience-based,” and “student-centered learning” were common elements within the lessons of participants in *Structured Follow-up projects*. Groups of teachers were planning together. Elementary classroom techniques were being utilized at the middle school level. Teachers of both levels were collaborating about lessons and techniques and receiving the benefits of university expertise to give them a comfortable handle on how to teach complex topics like density, probability, kinetic energy, and connecting geometric principles to real life.

Statistics and Probability

Structured Follow-up (SFU) classrooms were relaxed with jokes, laughter, and food readily shared. In the “Statistics and Probability” class, each student took part in creating colorful posters depicting the results of their learning and its effects on their students. The *SFU* classes culminated in a poster presentation session on December 3, 2005. All five teachers taught the same “Maze” problem, but each used his or her own teaching techniques for doing so. The project instructors videotaped the teachers’ lessons with students to share at a *SFU* class session. The result was that five different lesson plans were shared on the same problem. Teachers stated that the teaching DVD’s provided by the instructors were wonderful.

Forces and Motion

A visit to the “Forces and Motion” class found teachers working in small groups observing lines graphed on a computer from experiments done on an “air track, a frictionless track simulation with a motion sensor used for multiple types of physics problems. One of the instructors discussed with the class the results of their experiments which showed similar results on their graphs for light and heavy mass objects. Complex formulas were demonstrated with the “hands on” application using “air tracks.” Mass does not matter when there is no friction—the speed is the same. Kinetic energy, however, is a different matter. Connections were made to real life by comparing the impact of the kinetic

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energy of the mass of a semi vs. the mass of a compact car out of control on a highway. Sixth grade teachers often have a three week unit in “force and motion.” Few schools have access to this type of equipment, but district labs or company demonstration areas are ways to find access to such tools that could add greatly to student learning.

Members of the “Forces and Motion” class had numerous kudos for the course: Ryan Livingston of Patterson Elementary in Jefferson County reports that “After taking the physics class this summer, I re-planned my unit on “Forces and Motion” for my 5th-6th grade class. The final achievement data showed that my students learned more about physics this year in comparison to years past. I truly believe that I gained content knowledge that was transferred to my students.”

Chris Curtis, also from Patterson Elementary, states “the experience was enhanced because my entire team was involved. The discussions about content and methodologies increased my efficacy in teaching science.”

Jon Turner of Jefferson County Schools felt that “being involved in this project has impacted my teaching in several ways. First, having more knowledge of physics content made me more confident and capable as a science teacher. Also, the kids learned more this year than in prior years because of the communication and lesson creation process we used as a team. Finally, as a team we have created a physics unit that can be used year after year. Overall, this project has made a big impact on my students and my teaching.”

Carrie Jordan, another Jefferson County teacher, echoed a frequently heard comment: “I have changed the way I teach science and math due to the impact this project has had on me. I now provide time for kids to discuss and compose their own language. White boards are used weekly and partners/groups have learned to work together and collaborate to include all styles of learning and all personality differences. The 6th graders love coming into my science and math classes. They are building their own learning and concepts. They are talking and are active and becoming independent learners. I love what I am doing and seeing in my room!”

Geometry

“I have to ask more questions and talk less,” states a teacher in the Geometry *SFU* class. She relates that she feels better when the students make the connections rather than the teacher—a testimonial to the value of the inquiry method. One teacher noted that this class was a good mix of elementary and middle school people who made close connections during the course. They learned to connect what they were teaching to real life experiences. One teacher showed a video of a math club she conducts 2 to 3 mornings a week in her elementary school. Two students had made a list of all of the things they could create with geometrical figures. They then made a “blueprint” of their ideal bedroom and used a computer program called “Sketchpad” to design the room in segments. Another teacher described how she had her fourth graders create “pastures” for 20 toy animals. The students created 3 rectangles for pastures for the animals in 3 different ways and then determined which “pasture” had the biggest area and which had the smallest. The teacher then related how a middle school person told her this was a concept that was normally taught with difficulty at the 8th grade level.

Atoms and Properties of Matter

Teachers in all classes glowed with the positive results of their newly discovered teaching techniques. Aaron Tate of Brighton 27J said, “As a 3rd year teacher, I have

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struggled with effectively teaching the concept of density. However, with the activities that I have been introduced to as a result of this project, I have noticed that student achievement in relation to density has greatly increased this year.” Miranda Price of Flood Middle School in Englewood states, “As an elementary teacher becoming certified in middle school science and teaching 8th grade chemistry for my first time this year, this class has given me content that is easy to understand as well as enough explication through experiments, that I had the confidence to begin this year with chemistry as well as run successfully several labs to further my students’ learning.” Annette D’Urso Garcia from Adams County School District 14 notes that, “This project has helped me in many ways improve the quality of the program I deliver to my students. I feel much more secure in terms of the content as well as the literacy strategies. Also, there is a tremendous responsibility in my district for teachers to have students achieve proficiency, both for CSAP (Colorado Student Assessment Program) and A.Y.P. (Annual Yearly Progress). This class has given me knowledge that I need in order to make important decisions about what to teach and how to teach it.”

Earth Processes

Dave Lammers from Flood Middle School in Englewood had this to say about the “Earth Processes” course: “I am presently implementing lessons about hurricanes in my Earth Science and Weather units. Since taking this course, I have been able to take many things back to my students. The students actually come to class talking about current hurricanes with questions and observations they are seeing and hearing outside of class.”