

Creating Field Experiences that use a co-teaching model: A presentation at the National Middle School Association, November, 2004, Minneapolis, MN

By: Dr. Nancy Bell Ruppert, UNC-Asheville

Gifted geometry students at a middle school participated in the “Noonday Project™”(Ihor, 2004), an international, technology-based integrated unit to “discover” the circumference of the earth – just like Eratosthenes did in about 240 b.c. (Lasky, 1999). The original purpose of the experience was to allow pre-service teachers from the university to participate in a co-teaching experience so they would be supported as they worked with gifted adolescents. Co-teaching is a field-experience approach to helping pre-service teachers develop their teaching skills and dispositions. Co-teaching originated in the special education arena as an alternative to pull-out programs (Project Alert). This project used it with gifted children.

The project lasted for six weeks in the fall of 2004. The lessons were initially designed by two faculty members involved but as the weeks increased, the pre-service teachers and the gifted teachers worked with to analyze and plan the lessons. The pre-service teachers who participated in the co-teaching experience worked directly with the children during the lessons and debriefed with the two gifted teachers and the two university teachers. Every day that they participated they took on more and more responsibilities throughout the project so that at the end, they were leading the discussions and the other faculty were participating. Throughout the experience, gifted children developed their willingness to open up to the teachers in the room, question their new knowledge, and they created a product to display their learning. This project provided a win-win-win situation for all the participants.

Relationship to Turning Points

In Turning points: At the turning point of the young adolescent, there are six areas that are identified as ways to support the needs of adolescents. Turning Points starts with developing students intellectual capabilities. In this project the pre-service teachers were amazed to find that the students remembered activities they had participated in and were able to make connections between what they experienced and what they thought about the earth’s shadows. During this project students worked in groups and individually. Their final projects were individual allowing for differentiated instruction. One of the highlights of the project was that middle school students from New Zealand and Australia participated in the project. This served to enhance the students’ interest and students were able to look at where all the other schools were to talk about latitude and geography in our own country. Throughout this project students had a voice. They used journal writing which allowed them to create their own interpretations of what they experienced. We all watched the environment of the classroom develop into a safe, questioning place as the middle school students began to trust all of us. The students requested that we have pen-pals with the students from the southern hemisphere which served to inspire them to

become engaged in the world community. All six of the recommendations provided by Turning Points were experienced in this project. However, the benefits, while powerful for the adolescents were also seen in the experiences of the classroom teachers, the pre-service teachers and the university teachers.

Adolescent Impact

The adolescents were the target audience and they were provided with multiple experiences to determine the circumference of the earth. They witnessed a Eratosthenes skit, used paper plates to illustrate central angles; were asked questions throughout the experience about shadows and measurements to use higher order thinking skills; took practice shadow measurements throughout the day and uploaded the data on graphing calculators to view the parabola it created; created a measuring device and measured angles after creating a scale model of their morning shadows on the autumnal equinox; they debated which measurement to use for the “real” measurement after taking multiple measurements around “high noon”; they analyzed drawings of central angles on, above and below the equator to determine how to measure the circumference of the earth depending on whose latitude they were compared to; and they created products to display their learning. All of the activities focused on hands-on, and reflections to help students gain background in working with geometry. The responses of the students’ reflections indicate that they were able to connect previous knowledge to the experiences of the Noonday Project™.

Research in four different areas aligns with this aspect of the project. Project-based learning has been shown to engage, motivate and enhance student learning (Simkins, 2000). This project also served as background knowledge and will be used throughout the school year to engage students in geometric concept development. Background knowledge has been identified as a leading indicator of success in young people (Marzano, 2004). It is also known that intellectually, middle school adolescents want to participate in hands-on, real-life situations that challenge them to think (NMSA, 2003). The young people who participated in this experience had the opportunity to communicate with one another, with adults and with students from around the world, to develop their background of geometric principles. They had the opportunity to question their ideas and create products to display their knowledge. One student remarked, “I wish we could do more of this; we like building things and questioning.” It appears that this project is supporting research.

In-Service Teacher Impact

The second win-win-win recipients were the gifted teachers. The geometry teacher and the resource teacher participated with the university people throughout the project. It was a risk for the gifted teacher to allow university professors to come into her classroom and work with her students. Mondays and some Fridays throughout the entire month of September were taken up with this project. Throughout the project, the gifted teachers gave feedback to the pre-service teachers and to the university professors and by the end all the players were involved in the planning. The geometry teacher said she would

definitely conduct this project next year, and the gifted resource teacher is interested in using it as a grade level project for next year. This type of feedback supports research that indicates what affects change.

Risk taking is a characteristic of a teacher-leader and that these teachers were willing to collaborate with university teachers allowed the project to flow smoothly (Ruppert, 2003). Change cannot happen without risk. Curriculum change, according to research, is best accomplished when teachers work together toward a common vision and when they are supported by authentic experiences that take place over time (Kim, Crasco, Leavitt, & Karantonis, 2002). Risk taking on the part of the gifted teacher and a willingness to work together toward a common goal provided all the players with professional development. The leadership of the teachers at the middle school afforded the pre-service teachers to work as colleagues with professionals, thus inspiring them to develop their own professional dispositions. In addition, the pre-service teachers witnessed professionals trying new things, relating to the power of being life-long learners.

University Impact

The third win-win-win recipients were the university people. The pre-service teachers gained valuable experience working with gifted children. The co-teaching model used involved allowing the pre-service teachers to serve in tandem with classroom teachers as they learned how to question and work with children. The lessons were developed initially by and eventually with the instructors, and therefore more give and take was experienced between the pre-service teachers and the in-serviced teachers during the actual lessons, (as opposed to an instructor watching a pre-service teacher try to teach a lesson they developed). The feedback that took place immediately after the experiences provided the pre-service teachers with encouragement and knowledge of how the lesson went. The pre-service teachers who participated in this experience showed development with relation to how they interacted with children, and colleagues, and they became more willing to give suggestions as they developed their own confidence over time. They were able to analyze children and lessons from the experience; they participated in the use of the technology, and they were able to identify gains in experiences that provide a supportive-healthy environment (classroom management) where they were treated as colleagues.

Research indicates that field experiences that include co-teaching models influence change in curriculum and achievement of children. In a study of co-teaching, Indrisano and Birmingham (1999) assessed a six-year co-teaching experience that suggested the learning of children and teachers was enhanced. Another study by Deich (2001) presented an analysis of a year-long field experience that focused on co-teaching. She reported that pre-service teachers developed in their ability to assess students, use technology, and manage classrooms. The benefits of co-teaching appear to enhance pre-service teachers and the learning of children.

The two university teachers also were part of the win-win-win experience. Prior to the experience, the two professors examined the program standards as they related to the

math and the science methods courses as designed by the state. They found that there were some common experiences including best practices, unit design, understanding diversity, classroom management, and using technology. This project was an effort on their part to create an authentic field experience (in addition to the field experience that already exists) to integrate math and science, technology, lesson and unit planning, and assist students in developing their classroom management strategies. This project allowed the professors to work with the students, the pre-service teachers, and the gifted teachers throughout the project to trouble-shoot and plan. The experience allowed them to strengthen the field experience so that they will be able to use this project with all of their students next year. The experience supported the notion that collaboration is very powerful and enhances productivity.

In research, the power of collaboration is that it is engaging and inspiring for all the people involved. In a study of creating a healthy work environment, the impact of collaboration includes feeling in control, finding meaning, and receiving positive support (Edmonson, Fisher, Brown, Irby, Lunenburg, Creiton, Czaja, Merchant, Christianson, 2001). In a study of Georgia middle school teachers, Reames and Spencer (1998) determined that collaboration, risk taking and participative decision making impacted teachers work environment and their perceived productivity. The value of collaboration in these studies reflects the findings from the university reflections.

Lessons Learned

This study suggests three things. First, collaboration between education faculty and arts and science has the potential to strengthen programs in universities and in schools, which ultimately impacts the learning of children. The children in this study were engaged and proud of the projects they created. The children's knowledge of geometric terminology and the use of tools to display their learning has been enhanced. Our ultimate goal is to raise the knowledge level of our children through best practices and this project illustrates a way to do that.

Second, university-school partnerships that use a co-teaching model have the potential to enhance the experiences of the pre-service teachers who participate in it. Field experiences are identified as one of the key features of program evaluation (NCATE, 2004). The charge for colleges of education is that students have a variety of field experiences, that they build and that they provide candidates with authentic experiences. The pre-service teachers experienced a valuable opportunity to develop as professionals focusing on the skills and dispositions necessary for working with young people.

Finally, having university professors working directly with teachers over time has the potential to impact curriculum development and teacher efficacy. In this project, the university professors met with the gifted teacher prior to the project to share a vision of what to do. The gifted teacher was very open to the ideas and has since provided a lot of insight and suggestions for ways to enhance the project. In addition, she encouraged the gifted coordinator for the school to participate in the project. The collaboration of this project served to make all of the players better.

The use of this type of university partnership to enhance curriculum development for in-service teachers is well documented in research (Cristol & Gimbert, 2002). The Urban Systemic Initiative (USI) was a National Science Foundation in which urban school systems worked together to improve the way math and science was being taught. There was a strong university/school partnership that was an element of that initiative. Many teachers were trained to provide students with a deeper understanding of math and science. The role of the university must remain strong in order to prepare our future teachers and enhance the relationship between teacher leaders and university professors.

The pre-service teachers and faculty who participated will be able to use this model next year. The students will have this common experience to reflect upon throughout the school year. Using project based learning, a best practice, to enhance the learning of adolescents also provided an authentic, rich experience for pre-service teachers and provided professional development for classroom and university professors. Perhaps collaborating and trying best practices has the potential to inspire and motivate people on many levels to take risks and collaborate.

If you would like to view this project you can go to http://www.unca.edu/~nruppert/math_383_home.htm to view "The Circumference of the Earth Unit".

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