Bringing Real-Life Mathematics to a Fifth Grade Classroom

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Overview:

In winter 2011, Dr. Susan Cooper (formerly of the University of Nebraska-Lincoln) collaborated with mathematics teacher Kyla Hall to incorporate a college-level mathematics project into a 5th grade classroom. The project looked at a simplified study of a report from the Centers for Disease Control and Prevention (CDC) which investigated ideal vaccination rates in preparation of a possible smallpox attack. Our goals for the collaboration were:

- To introduce the 5th graders to higher-level mathematics.
- To introduce the 5th graders to real-life applications of mathematics.
- To instill *good habits of mind* in the everyday problem solving of 5th graders.
- To immerse everyone in a unique collaboration between a research mathematician and a teacher.

Project Components:

The simplified study involves tracking the number of people in each stage of a disease and determining possible ideal vaccination rates. The project packet had the 5th graders complete a number of tasks. The main tasks included:

- Reading a non-fictional story from a children's magazine about a scientist using good habits of mind.
- Reading and understanding some of the project's background. This included understanding necessary assumptions on how to round the number of people in certain stages of the disease.
- Tracking the number of people in certain stages of the illness both by hand and with the use of a provided computer spreadsheet.
- Determining an ideal vaccination rate and reasoning through why such a rate is appropriate given the complications of vaccination. This exposed the 5th graders to a question which had no one right answer.
- Provide an in-depth report on their findings from the project.

What had to be done in order to make the collaboration successful?

A number of things had to be done in order for the collaboration to be successful. Some of these included:

• Permission from the school principal and IRB approval had to be obtained beforehand.

- The original college-level project had to be modified for 5th graders.
- Students had to practice good habits of mind in a number of smaller projects beforehand.
- Classroom time had to be found so the standard curriculum had to be accelerated. This was done by spending less time on review and providing less independent homework time.
- The 5th graders had to be prepared for the introduction of Dr. Cooper.

Reactions from Students and Parents:

Overall, students and parents greatly supported and appreciated the project. Students expressed that they felt important and that they enjoyed the application to a real-life problem. In addition, students expressed that working with a research mathematician was very rewarding. Indeed, some 5^{th} graders expressed that they want to be a mathematician when they grow up. On the parent spectrum of feedback, we were told that the 5^{th} graders spoke highly of the project in the safety of their homes and that their children were very engaged in the activity. Some parents expressed that they would like to see the project continue for other 5^{th} graders so that more could benefit.

Our Reactions:

We both enjoyed the collaboration a great deal. Although we wish we could have had more time and go slower at the end of the project, we both felt that the collaboration was a huge success. A few things that ensured this success were:

- We did the project in the winter which allowed Mrs. Hall to get to know the abilities of the student's before the project was modified and incorporated. This allowed us to trouble-shoot problems beforehand.
- We chose to do the project in the winter so that certain curricular items had been mastered by the students.
- The students were introduced to Habits of Mind problems before the project began. This allowed problem-solving skills to develop, especially the ability to handle open-ended questions.
- The students worked closely with Dr. Cooper which helped the student buy-into the project more than they might have. This also helped students understand a bit better what a professional mathematician does within the career.

Finally, the experience gave Dr. Cooper great insight into the challenges of K-12 mathematics education. This experience allows Dr. Cooper to engage with the teachers in her university courses on a more meaningful level which is crucial to the improvement of K-12 mathematics teacher training.

We would both repeat the collaboration and encourage others to engage in similar activities.