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Case Study

Beth Espinoza's Integrated Advanced Geometry

School: Thomas Jefferson Charter School

Grade Level: 10th grade

Teacher: Mrs. Espinoza

Textbook: Core-Plus Mathematics, Course 3

It is a little before eight in the morning and the chitter-chatter of students can be heard in the high school common room of Thomas Jefferson Charter School directly outside Beth Espinoza's classroom door. With each student that walks into the classroom early, Beth greets them with a joyful, "Hello, how are you today?" and always includes the student's name at the end of her question. A bell does not ring, but the students instinctively filter into the classroom so that everyone is at their assigned seats, in their groups of three, by 8 o'clock.

The block schedule period of Integrated Advanced Geometry begins with the students looking to the SMARTboard for the instructions for the CSR (the warm up for the day). Different methods of answering the CSR questions are utilized by Beth to 'keep it interesting' and 'never have an ordinary day.' Some days, students answer the questions on a piece of paper and Beth goes over the answers on the overhead. She will also have students write their answers and process on the whiteboard to show how he or she solved a problem. Miniature, handheld whiteboards are another way students completed their CSR where a problem would be

displayed on the SMARTboard and each student would hold up their written answer on their own whiteboard. The problems ranged in type, but are used as a review of a concept previously learned that was going to be encountered in the next investigation or as a review of material students are struggling with in the current unit of study. The questions of the CSR always revolve around the students deciphering what an equation means and the symbols that it comprise of or being able to 'read' a graph, picture, or chart and use explanations to solve a problem.

The next activities follow from the combination of the inquiry approach of the school and integrated approach of the class. The inquiry approach is one of investigation and experiential learning, while the integrated learning means both within real life practical application and connection among mathematical ideas. The intersection of both produces what one witnesses occurring in Beth Espinoza's classroom.

Beth guides the students to start the beginning of a new lesson, the investigation, as the *Core-Plus Mathematics* textbook rightfully calls it. When one thinks of an ordinary high school mathematics textbook, some of the aspects that possibly come to mind are statements of foundational equations derived by mathematicians to solve problems with rows after rows of problems to complete to ensure the students practice and practice. This book is not an ordinary high school text and has none of these things. Instead, it is a revolutionary new way of teaching students to use analytical reasoning and problem solving to find the answer.

How can there not be equations in a mathematics text you might ask. The students derive them on their own. The answers to the investigation are never only a number or symbol.

The questions invite the students to delve deeper into the meaning behind what they are seeing, reading, and thinking and then answer in thought out written responses. In Mrs. Espinoza's class, the students use a group work method, as produced from the clusters of three they sit in, to navigate their way through and investigation using brainstorming and reasoning.

Nevertheless, when Beth observes, from her constant monitoring of each group, that the class as a whole is having problems with particular aspect of the investigation, she will call attention to the front of the room and turn the learning into a class effort. Beth will then propose a question of how a problem is functioning and wait for a student to answer or call on someone. During the investigation, she never tells the students the answer, but utilizes a Socratic questioning approach to direct the class towards what she knows is her final, targeted outcome. One of Beth's main expectations is that her students are actively engaged in learning and thus are prepared to be called on at any point of a discussion.

However, there is a time in the classroom when Beth will give the answers away. This is only after an investigation has been completed over the material and the class is going over homework they have already attempted. She feels it is important to make the mathematical process explicit so students have an idea of what needs to be going through their head for any given problem. This is accomplished through how she verbally talks through what is the mathematically process and reasoning she uses to solve a problem, while visually showing the steps on the overhead projector. During this time, students are still actively engaged in the process and still are responsible for potentially being called on to answer the next step of the

problem. Beth most of the time will still never fully finish a problem and leave it up to the students to complete it with the helpful hints or starting point she has just modeled.

The quiet alarm from the computer sounds in the background as the SMARTboard pops up with a notification: *period 1 class is ending*. The students, however, continue to diligently work on the task at hand until Mrs. Espinoza gives them the go ahead of, “ok, you can pack up your things now.” She reminds them of the homework they are to complete as they slowly filter into the common room to eagerly continue learning what knowledge has to offer them.