CMST Challenge Project- Paper

Bullseye Models

Problem Definition:

Throughout this problem students explored the concepts of probability, percentage, and graphic representations of data. Students began by discussing the variables involved in playing a game of darts including: player skill level, strength, accuracy, coordination, gravity, etc. They then made hypothesized the number of darts out of 100 attempts that would land in each of the point value areas. During the remainder of the project, the class tested their hypothesis through a real life dart board model and an online dartboard simulation model. Students used a real-life magnetic dartboard to collectively gather data on 100 darts thrown and an online simulation dartboard to collect data individually on 100 darts thrown. Students then analyzed the data and used Microsoft Excel and Geometer's Sketch Pad to graphically represent the data within a circle graph. Using Excel students made circle graphs that represented the number of darts that landed on each point value area. Students used Geometer's Sketch Pad to create a graph on the number of darts that landed on odd vs. even point value areas. Students learned a great deal about circle graphs and the mathematics involved in creating them.

Problems Encountered:

We encountered many technical difficulties throughout the CMST Challenge Project. We have two computer labs in Freddie Thomas High School, but they are not set-up for classroom or instructional use. There are not enough computers or chairs for an entire class. Because attendance in my class is not consistent, we did not have too many difficulties with the number of computers available. The computer labs are also set up so that all students are seated facing the outside wall of the room. Only five or six students are facing the front of the room where a teacher can give instructions or demonstrate how to use a new program. The set-up of the computer labs made it very difficult to provide instruction to the entire group. Ms. Samis and I found that it was much more effective to move around and help students individually. I was very lucky to have the opportunity to work with Karen Samis, a past CMST participant; because I knew she was familiar with the software that we were using in the classroom. Nearly all of my students were completely inexperienced in using the software so they needed a great deal of assistance when creating their first circle graphs in Excel and GSP. Some students had never logged into a

computer at Freddie Thomas prior to this project and it took us some time to work out the details of how to successfully log on for the first time.

In order to use any of the computer labs in Freddie Thomas High School, you must sign up ahead of time in the computer log. Ms. Samis and I did not have hard time finding time when the computer lab was available according to the log, but after signing up we found other classes using the computer lab twice! The first time this conflict occurred we used the computer classroom on our floor which is usually unavailable for use. Unfortunately, the CMST Software was not downloaded onto any of the computers in this classroom. I spoke to our CMST coaches about this problem and they have since tried and been unsuccessful in having the software downloaded onto these computers. This computer classroom is very nicely set-up for instruction and demonstrations and would have made my Challenge Project much easier to complete with my students.

Another problem we encountered during the project was difficulties with the printers. More than once the printers were not working properly and this made it very difficult for students to print their circle graphs.

Evaluation of results:

Students' hypothesizes about the number of darts to land on each point value area were chosen randomly. Because there are so many variables associated with a dartboard it is nearly impossible to successfully hypothesize the results. All students who were present were able to create a circle graph in Microsoft Excel and GSP to represent the data gathered collectively using a real-life magnetic dartboard. Some students greatly struggled with the online simulation of a dartboard and were therefore allowed to work with another student when collecting the data. Students did not require quite as much guidance and instruction when creating their second circle graphs in Excel and GSP, but they were far from independent. Students needed a great deal of guidance in the mathematics involved in creating a circle graph. Additional practice and instruction is needed so that students can complete this task independently using tools such as a compass and a protractor.

Summary of Experience:

Overall, I believe my CMST Challenge Project was successful in a number of ways. My students learned how to use two different software programs, Microsoft Excel and Geometer's Sketch Pad. The project captured their interest in these software programs. Students also learned a

great deal about gathering data, converting it to percentages, and using the percentage to determine the number of degrees in each section of a circle graph. I believe students enjoyed going to the computer lab and now that they fairly familiar with two software programs, future lessons involving these technologies will be much easier to implement.

Curriculum Standards:

Problem Solving Strand-

7.PS.1   Use a variety of strategies to understand new mathematical content and to develop more efficient methods

7.PS.6   Represent problem situations verbally, numerically, algebraically, and graphically

Communication Strand-

7.CM.4   Share organized mathematical ideas through the manipulation of objects, numerical tables, drawings, pictures, charts, graphs, tables, diagrams, models and symbols in written and verbal form

Connections Strand-

7.CN.9   Recognize and apply mathematics to other disciplines, areas of interest, and societal issues

7.CN.2   Recognize connections between subsets of mathematical ideas

Representation Strand-

<u>7.R.1</u>   <u>Use physical objects, drawings, charts, tables, graphs, symbols, equations, or objects created using technology as representations</u>

7.R.8   Use representation as a tool for exploring and understanding mathematical ideas

Measurement Strand-

7.M.4   Draw central angles in a given circle using a protractor (circle graphs)

Statistics and Probability Strand-

7.S.1   Identify and collect data using a variety of methods

7.S.2   Display data in a circle graph

7.S.10   Predict the outcome of an experiment

7.S.11   Design and conduct an experiment to test predictions

7.S.12   Compare actual results to predicted results