**5E Reflection**

The engagement part of my 5E plan was a demo that shows the effect that inertia has on an egg that is sitting atop of a toilet paper roll and a pie pan. The pie pan is strategically placed over top of a glass of water. The desired result of this experiment is for the demonstrator to tap the pie pan, causing the egg to fall directly into the glass of water.

I started the demonstration out with a class discussion about the concepts of inertia and gravity. For the most part this is review for my 5th grade classroom. Grayson responded “gravity is pulling objects towards the center of the Earth” (0:04). I did a good job of explaining the set up for the demonstration. I told them step-by-step what I was doing in order to arrange these objects. Although I was doing a good job of explaining the procedure, I was getting a little bit nervous. I never accounted for the possibility that it may not work. Which was exactly what happened. As I look back on the audio now I find that I did a good job of having the students explain to me why the experiment did not work (3:12). I maintained my calm exposure and had the students explain what they had seen. One of the students explained to me “we hit the glass too hard” and also that “we hit the glass too fast” (3:35). Another student went on to explain, “you did not hit the right part, and you hit the glass”. All of these explanations were correct. During this time I had the complete attention of all the students in the classroom. As I tried the experiment for a second time, I was successful in landing the egg into the glass of water. The class seemed to be very impressed, and my nerves were beginning to calm down. During my preparation of materials for this demonstration, I had decided to bring several eggs so that I would have extra if something went wrong. Although the demo did not work on the first attempt, it was a relief that I had back up materials to use for a second attempt.

Together as a class we explained why the experiment worked. The first explanation from Grant was that “gravity is pulling the egg down” (6:18). The next student explanation was discussing the effect of inertia. One student tells me that inertia will cause the object “to stay still” (6:40). This is an accurate demonstration of how inertia means “laziness”. The students made great connections to our initial discussion and the demonstration with the egg.

For the explore portion of my 5E plan, students were collecting data on the distance a ball can push an index card as it rolls down a ramp. Each group was testing the distance that their ball could push the index card as it came down the inclined ruler. The control variables were the ramp (block of wood and a ruler), floor surface area (tile), and the index card being pushed. The experimental variable was the marble being tested. Each group took a total of 10 measurements and then found the average. I allowed the students to choose as a class how many experimental trials they wanted to do with their marble. The decided as a class that they would like to complete ten trial errors. This experiment was set up for students to conclude that mass has a direct effect on inertia. The more mass an object has, the more inertia it will have as well. The students are able to conclude this by seeing that the heavier ball is able to push the index card much farther than the lighter ball.

The first thing I noticed during this part of my lesson was that the certain students who usually have a hard time focusing, were very engaged during this time. Each group member worked cooperatively with one another to conduct ten different tests of their given marble and all students seemed to be on task. The students constructed a table to record their results and then worked together to find the average of their ten marble rolls.

While reading a chapter from the book *Invisible Force*, we discussed the things that we had learned about gravity and inertia. One of the students concludes that an object is only brought to a stop by “an outside force” (47:49). After I have finished reading the passage from the book I discuss real world examples of inertia with the students. One student replies that inertia takes place “with a ball that is rolling” (48:38). Here the connection was made that the ball will continue to roll in a straight line until another force acts on it. Another student tells the class that when the car brakes are hit really hard “the car stops, but your body keeps going: (49:00). This is a great real-world example of inertia that all of the students are able to relate with.

As I started with the explain part of my lesson I was having a little bit of difficulty starting the smart board. Looking back on my lesson I now realize that I should have already had the graph pulled up on the smart board before I went ahead and began with the lesson. This would have resulted in my directions being a little bit clearer, and also would have prevented the frustration that I was having. Before this lesson had begun my cooperating teacher had told me that the students were very capable of finding averages, as well as creating line graphs. I found that all of the students were able to find their averages, however it took a little bit more explaining than I had planned for. Once I realized that it was necessary I talked them through the process of finding what the average was for their certain marble. This surprised me a little bit.

On the audio at (2:39) we hear Westley explain to us what the experimental variable is for this experiment. He goes on to explain that each group had a marble that differed in weight. “We each have different marbles, heavier and softer. We had a ping pong ball which was lighter than the other groups”. Westley correctly identified what the experimental variable was for this experiment, which led the class to decide on the information that we would label our X-axis with.

I felt that the students were able to relate to the graph much better after each group came and graphed their points onto the smart board. I decided to show the graph as a whole so that as a class we could compare our results. Allie pointed out that “their tables went the least and my tables went the most” (22:19) when we began to compare the data we collected from each of the groups. By “tables” she is referring to the different groups. This comment let me know that they could understand that the graph was showing us the differences in the distances that each marble traveled. The students could see that as the mass of the marble increased, so did the distance it was able to push the index card.

As I wrapped up the lesson and we discussed the relationship between mass and inertia, Payten replied, “the more mass an object has, the more force it is going to push onto the other object” (29:34). I was so excited to hear this response! Payten was able to conclude based on the data that was collected that objects with more mass also have more inertia. The students in this group later told me that because the index card has very little mass, this means it has little inertia.

After going over the audio from my 5E lesson I am able to realize that it is necessary to ask higher level thinking questions more frequently while teaching my lessons. Often times I caught myself only asking yes or no questions, and these do not require the students to think critically. By asking higher order questions, I would be implementing a more sufficient thinking process for the students. It is necessary to have the students think critically and learn how to solve problems through these higher-level questions.