Classroom Discussion of Roller Coaster Investigation

Teacher: I want you to look at these different variables and play around and create some graphs and figure out what you can find out about these coasters. Where you start playing around with the data, create the graphs that you want to create. We can help you if you get stuck on actually how to do something. And come up with some interesting things you can share with us about these coasters. Okay? Alright let's find out about these coasters.

Teacher: Who is that?

Student 1: It's this one, and this is the top speed, and it's the longest one.

Teacher: And it's the longest one. Hmmm, so...how do you know that it's also the longest one?

Student 1: Because we pressed length and dragged it down there, and that was the last one.

Teacher: Oh I got it. So, you know what? I'm going to show you a trick. So that you can look at these two variables at the same time. Okay so you have length on there right now. And if you take, if you're also interested in top speed, drag top speed into the center of your graph and watch what happens.

Student 1: Oh no, it wasn't length, uh, it was the height.

Teacher: Oh it was the height?

Student 1: So, put the height right here then, I guess.

Teacher: There you go.

Student 2: (inaudible)

Teacher: So what do you think these different shades of green mean?

Student 1: It's like, the darkest one is like, the top - like, the fastest one, and the lightest one is the slowest one.

Teacher: Yeah, yeah. So here's a way where you can actually look at two variables at the same time.

Student 2: So then, if you press the lightest one…

(Next screencast with a different pair of students)

Teacher: Make, make an interesting graph. Recreate an interesting graph that you've created.

Student 1: Okay, okay, um..alright.

Student 2: Watch he's going to do this so good.

Student 1: Well we stopped actually editing the graph.

Student 2: There's two people recording us, right now...

Teacher: Yeah it's hard sometimes to…

Student 1: And then…

Student 2: Put me in the Centennial page, I beg you guys.

Teacher: And then scroll this over then you can get to the top speed.

Student 1: Ahh..

Teacher: Is that what you're trying to do?

Student 1: Ahhh, yeah.

Teacher: There you go.

Student 1: That's fancy.

Teacher: Fancy, fancy. Oh wow, so what kind of graph is that?

Student 1: It looks like a spaceship.

Teacher: It looks like a spaceship?

Student 1: Yup

Teacher: (laughter)

Student 1: It looks like an aurora.

Teacher: Yeah, it does kind of look like an aurora. You know what that -

[The teacher selects several students to share their investigation of top speed and maximum length of drop and facilitates a whole group discussion about their findings.]

Teacher: So they created two graphs. Tell us about your graphs and what you found out.

Student 1: Umm..we found out that the, um, the Top Thriller Dragster in Cedar Point that's in Ohio has the highest drop and the highest speed.

Teacher: Oh ok, so you created these two graphs and then you looked at the one that was, um. Did you first… did you click, when you were clicking on the dot did you click on the dot in the drop or did you click on it in the top speed?

Student 1: The top speed.

Teacher: In the top speed. So you clicked on it in the top speed, so you found the one that goes the fastest. And then you noticed that it also had the biggest drop. Alright. Do you think that that's true on the other end? The one that's the smallest, that has lowest speed also has the lowest drop?

Student 1: No.

Teacher: No? Alright, did you test it out? Did you look?

Student 1: No but now I'm tempted.

Teacher: Now you're tempted? Well go ahead, click on one of those low speeds and let's see where it is.

Student 1: I guess so.

Teacher: Yeah, it's down there. Alright, so, if we don't have a lot of speed, probably in this case here we didn't drop very far. Okay.

[Next pair of students comes to present]

 Student 1: So what we did was we got the top speed.

Student 2: So we did the top speed and the drop. And we put the drop in the middle of the screen.

Student 1: And that's what ours looks like. The darkest green matches the biggest drop, the lighter the green the lower the drop is.

Teacher: Alright, alright. So they, so they used that color like you guys were doing, um, but they had top speed on the x-axis. So this graph kind of tells us some of the same information that the two graphs made but it's all in one graph. Alright and we were using color to kind of show the intensity of drop. Nice thank you.

Student 1: We also did something with max height but for some reason the two at the top didn't show, so we thought that, um, they didn't, probably weren't running anymore and only The Fury would show.

Teacher: Oh I wonder if we just needed...so so, with the max height did you put it where you put top speed on the x-axis is that what you mean?

Student 1: Yeah.

Teacher: Go ahead and drag max height on there.

Student 2: Oh and me and him were just having some fun. So we was just looking at what was on North Carolina.

Teacher: Uh huh.

Student 2: And I think it was...um Fury 35 or something like that and something else.

Student 3: [whispering, inaudible]

Teacher: Intimidator.

Student 2: And Fury 35 was one of the best ones in max height and top speed and drop.

Teacher: Yeah that coaster looks crazy.

[Next pair of students comes to present]

Teacher: While they're doing this, from some of the things that you learned so far, we had 157 roller coasters from the U.S. Do you think those are all the roller coasters from the U.S.?

Class: No.

Teacher: No, alright there's actually a whole lot more. I'm not even sure how many there are but I think it's over 1,000.

Student off camera 1: I didn't even see my favorite roller coaster.

Teacher: You didn't see what?

Student off camera 1: My favorite roller coaster.

Teacher: He didn't even get to see his favorite roller coaster. So we don't have them all, we have a sample of them, ok. And we're learning some things, and, one of the things we just looked at was top speed and drop and we were looking...It was fun to kind of that special coaster that had the, that had the um, the top speed, the highest speed in our data set, and the largest drop. But we don't know if that is *the* largest with top speed and drop. Alright. Alright, yeah so, so.. and again they were looking at drop and top speed but they arranged the graph a little bit differently. Alright, can you tell us a little bit about your graph?

Student 1: Well...we, we were, I was, we were just playing around and we were comparing drop and top speed. And then I added in type. And this is how we came up with this graph.

Teacher: Okay. So does anybody know what this type of graph is called?

Student 1: Also, animated crane GIFS.

Teacher: (laughter) Yeah we can drag and change, the um, the axis. This is called a scatter plot. And you're going to learn more about that later. Alright but this is called a scatter plot where you actually use two different variables in a very specific way where one is on the x-axis and one is on the y-axis. And what they did was, they put the type with wooden versus steel overlay here. So steel is green and wooden is like pink. Does that tell us any new, any new information? What do you think that tells us?

Student off camera 2: Well, that one, over time since you know, they've changed since the 1900s when they started making them. Um it might not have been so safe for people going to see them. So they stopped making wood and they made steel.

Teacher: Ok, so a lot of our newer ones might be made of steel, over time. Um, they still do make wooden coasters but they tend reinforce them with steel---

Student 1: Yeah.

Teacher: So there's steel in them you know. Alright, what can we tell from this graph about wooden and steel coasters?

Student 1: There, there, there, uh there seems to be more steel coasters than there are wooden

Teacher: Ok, there seems to be more. So in our data set there seems to be more steel coasters than wooden coasters. I see more green than I do pink. Yeah?

Student off camera 3: Uh, wooden coasters seem to be like in the same range of drop.

Teacher: The wooden coasters all seem to be all clustered together in the same range of drop. Alright. So there's this big cluster of pink.

Student 1: Because roller coaster makers before steel coasters were introduced, they all, well except for that one, the High Speed Thrill Coaster-

Teacher: (chuckles) yeah-

Student 1: -they all wanted to make their coasters fast and exciting and stuff, but they didn't want to make the coasters dangerous because they would lose, um, customers.

Teacher: Yeah

Student 1: So, they all built them around the same range, that's like the maximum of wood's potential-

Teacher: Em-hmm-

Student 1: -before becoming not structurally sound.

Teacher: Yeah.

Student 1: And then once steel was introduced, people started going, um, further to either side.

Teacher: Yeah, yeah. So they started having, they started having, um, and do you think that how far you drop maybe has anything to do with the speed of the coaster?

Classroom: Yes

Teacher: If you have a pretty big drop that gives you-

Student 1: Gravity creates momentum.

Teacher: That's exactly right. Our gravity is going to create some momentum and you're going to start going faster. Alright, so probably you hit your max speed either on that drop or shortly after that drop. Alright. Okay good thanks guys! Thank you for coming and recreating this. So, um...