Lesson Plan #4

Lesson: Analyzing Data (12-3)
Length: 45 min
Age or Grade Level Intended: Algebra II Honors

Academic Standard(s): A2.9.2 : Use the basic counting principles, combinations, and permutations to compute probabilities.

Performance Objective(s): Given 12 problems on counting and probability, students will answer them with 80% accuracy.

Assessment: 12 problems from the text will be given as homework and will be handed in tomorrow.

Advance Preparation by Teacher: No preparation needed.

Procedure:

Introduction/Motivation: Yesterday we went over how to do conditional probability. Today we will be looking more on how to analyze data that we have been finding probabilities for.
Have the students draw the face of a cat and a boxing ring on a piece of paper. Ask for 3 or 4 volunteers to draw both of their pictures on the board. If you can walk around and pick some that are a lot different that would work best. Ask the other students what all the cat faces have in common and all of the boxing rings have in common. The cats should all have whiskers, the boxing rings should all be rectangles or squares. (Gardner’s Bodily/Kinesthetics)

Step-by-Step Plan:
1. Ask the students to hypothesize why they think I would be talking about whiskers and boxes in math class. If no one answers this correctly ask them if they have ever heard of a box-and-whisker plot. (Bloom’s Synthesis)
2. If any of them have questions ask them to draw one on the board. If no one has, ask if anyone thinks they know what one would look like and wants to draw it on the board. If they draw it wrong just correct them unless another student wants to try. If no one wants to, then just draw it up yourself.
3. Explain how you make a box-and-whisker plot when you want a way to model a group of numbers. Label the median, the upper and lower quartile, and the medians of the quartiles.
4. Tell them you are going to rewind and tell them how to find the median.
5. The median goes in a group of 2 other vocabulary words, mean and mode. Ask the students if they know what any of these mean. If they don’t tell them. (ANS: mean= the average, median= the middle number in the group, mode= the number occurring most often)
6. Do example one on the board:
   Mean: 98+95+99+97+89+92+97+62+90= 819, 819/9=91,
   Mode: write in order; 62, 89, 90, 92, 95, 97, 97, 98, 99; mode= 97 (occurs twice)
Median: take the numbers in order, find the middle number. Median = 95

7. Ask the students what you would do if you had an even number of numbers, so when you tried to find the median you had 2 numbers in the middle. (ANS: find the average of them 2 numbers, so add them up and divide by 2) (Bloom’s Analysis)

8. Take them back to the box-and-whisker plot and tell them that for this one, the middle of the box would go over 95 on the number line. Explain that the ends of the box are the median of that half of the numbers. So for the last example you would take 62, 89, 90, and 92 and find the median to fine the lower quartile (the median of the lower half of the numbers). This would be 89.5.

9. Ask a student to find the upper quartile. (do this the same way with the highest 4 numbers, ANS: 97.5) (Bloom’s Application)

10. Now you point out that the whiskers are made by drawing a line from the box to the min and the max numbers in your original set. Ask one of the students what the min and max is for our set. (ANS: min=62, max=99)

11. This will complete the box-and-whisker that you should now have on the board for them to see. (Gardner’s Visual/Spatial)

12. Tell them that the only time the min or the max isn’t the lowest and the highest number in the set is if there is an outlier. This means a number that is way higher or lower than the rest of the numbers. See ex 6. 98 is obviously much larger than the numbers in the set.

13. Let them know that example 3 is another example of a box-and-whisker plot for them to use on their homework, but we aren’t going over it now.

14. Next we are going over exercise #5. In this we are finding what numbers are in what percentile in a set of numbers. They list 20 numbers and then put them in order and ask to find the numbers in the 20 percentile and the numbers in the 65 percentile. To find the 20 percentile you take the amount of numbers you have (20) multiplied by the percent (20%). So you have 20x.20=4. So the lowest 4 numbers are in the 20th percentile. So 21, 24, 31, and 45 are in this. so the number that is at the 20th percentile is 47.

15. Ask the students why it’s not 45 (ANS: since 45 is in the lower 20 percentile it can’t be AT the 20th percentile, so it is the next higher one). (Bloom’s Evaluate)(Gardner’s Logical/Mathematical)

16. Ask the students to find the 65th percentile on their own. Walk around the room and see how they are doing. (Gardner’s Intrapersonal)

17. When they are done have someone that got it right do it on the board. (ANS: 87 is at the 65th percentile)

18. Assign problems 1-6, 8-11, and 14-15 and have them work by themselves.

**Closure:** In the next lesson we will learn more things to do with sets of data. We will learn how to find the standard deviation and the interquartile range. Standard deviation can be used in a number of different ways. We can find how much the height of the students deviate, as well as test scores, shoe sizes, etc.

**Adaptations/Enrichment:**
Student with learning disabilities:
I will copy the notes for the lesson and give it to him/her before class starts. By doing this they can fully focus on what I am lecture about and on my examples rather than trying to write down what I am saying.
While I am walking around the class on step 16 I will ask them if they understand what we have gone over so far. If they then I will tell them I will help them this is the last example and I will help them right after this while the rest of the students start their homework.

I will tell the student ahead of time that I am going to call on them for an answer. This way they know it is coming and they have time to think about it and don’t have the stress of getting called on unexpectedly and having to think of an answer quick.

When they work on their homework, I will let this student work with someone else. I will match them with one of the higher level students after previously talking to the other student about it making sure it is ok. If it sometime easier to learn when one of your peers tells you how to do it

**Reflection:** I will be able to make sure the students know what they are doing by calling on them and asking if any of them have questions. The hardest thing in this lesson is finding what number is at a certain percentile. This is why I am giving them one to do on their own while I walk around and see how they are doing.