**Sampling Distributions Lesson Reflection**

I delivered this lesson three times on October 8, 2014 to three sections of David Rauth’s Introduction to Biostatistics course. Dr. Kern observed my third lesson as the official observer. After each lesson, I asked for anonymous student feedback in writing. Two lessons were back-to-back, so I used feedback to improve my third lesson. Some ideas would have been too involved to implement for the third lesson, but I look forward to incorporating them in future lessons. Overall, each lesson went well, but there is always room for improvement. Both the students and Dr. Kern had good suggestions for improving the lesson.

One aspect of the lesson that I felt uneasy about was my inclusion of sigma, the population standard deviation, in my graphics and final summary. I felt the lesson would be lacking without it, however, going into detail about it during the lesson would be premature. Professor Rauth wanted to talk more about it in upcoming lessons. It was difficult to come into someone else’s classroom and teach an isolated lesson. If I were teaching the class, I would know how to handle the concepts and flow of knowledge from one lesson to the next.

The biggest issue I had in each lesson was constructing the sampling distribution histogram from the students’ sample means. In the first lesson, I started too high on the board and ran out of room. I had to collapse the data making it spread over a wider area rather than a taller one. I did this with each interval even if I still had room to graph, because I needed to keep the intervals consistent to maintain the integrity of the final shape. One student commented that I handled this well: “I thought you handled it well. You didn’t let the lack of space while graphing affect you.”

None of the student-generated sampling distribution histograms looked perfectly normally distributed, but I could still draw a rough normal curve around the data to make the point. I had a few ideas of why this was happening—it may have been the choice of intervals and/or the fact that we were only approximating a complete sampling distribution but the students’ set of samples may have missed some combinations of individuals from the population and doubled up on others. I made sure to explain this to the students. Dr. Kern and a student suggested that intervals one-unit in width may result in a shape that better approximates the normal distribution.

Several students commented that the activity was too drawn out; it took too long to graph each student’s data. One student suggested that each student could mark his or her own values on the histogram. This student also suggested that it would be “cool” for students to enter their data in an Excel worksheet. Then we could graph the data electronically and calculate the exact mean, which we could not do by hand with 210-280 samples. In the future, I might try assigning the simple random sample calculations for homework and have students mark their own means on the histogram as they enter the room the next class. This would save time and allow for a more detailed look at sigma during this lesson.

**Sampling Distributions Student Feedback**

I received 87 responses to the student evaluation questions.

Fifty students commented that my presentation was well done with clear explanations. Twenty of these students specifically pointed out that the power point was well done with good visual points.

“I thought the lesson was covered well. I feel that I have a better understanding of population and sampling distributions.”

“I thought she did an awesome job getting her lesson across while keeping the class engaged and interested.”

“The power point was helpful. I liked being able to read the information while also hearing it.”

“I really understood everything and it was explained very well.”

“Everything was well explained in easy to understand parts and all visual aspects were helpful.”

“I found the power point to be very helpful and the use of illustrations to show the relationship between populations and samples.”

“The explanation of selecting the random sample was very good.”

“The power point helped visualize what you were saying.”

“The explanation of Table B [random digits] was good and thorough. You also made it interesting.”

“You explained everything clearly and left no questions unanswered.”

“I thought the fact there was an explanation for why [the graph] wasn’t perfectly normal was good.”

“I thought there was good balance between power point and board work.”

Fifty-eight students liked the interactivity of the lesson. They commented that the activity helped their understanding of the material, made the lesson fun and interesting, or showed them the practical value of the concepts. Twenty-five students said the activity dragged on too long with having to wait while everyone read their values. Most of these twenty-five were also part of the 58 who liked the activity overall.

“I liked actually doing the calculation instead of you doing all the work.”

“It helped to actually take samples and understand where values come from rather than looking at previous sample’s results all the time.”

“The example problem was useful to see how data can be randomly sampled and how the “true” mean can be found.”

“I found the process of collecting all the means from 8 random samples to be interesting. I always enjoy engaging activities that make me do work in class.”

“The aspect of the lesson that was most interesting/practical was the activity where we all got to calculate the averages individually so we all got involved.”

“I really liked the interactive portion of the lesson. Being able to actually do the calculations helped to cement the idea.”

“The choosing of the numbers from the sheet helped me better understand SRS.”

“I found the entire presentation interesting. We were involved in the lesson, so that made it more fun and easier to follow.”

“It just took a while to go through all 35 people saying their 8 numbers…maybe do a few less numbers if the outcome will still be similar.”

“The class example we did was interesting and helpful but it kind of dragged on so maybe have students go mark it themselves or if you have an Excel spreadsheet and make everyone input their numbers it would be cooler.”

“The part where everyone had to say their number was a bit lengthy. Maybe use 4 or 5 instead of 8.”

“I liked the example we did because it was easier to visualize what we were learning.”

Sixteen students said they found something interesting about the content or activity. Their comments about what was interesting showed me that they understood the main point.

“I thought it was interesting to see that we as students can choose the values, and we can see hands-on that the values actually represent a population almost exactly in a normal curve.”

“I found it interesting that we can use these sampling distributions to find out information about the population.”

“I found it practical when it was described how samples are used because some populations are too large.”

“I liked how you explained that the purpose of statistics is to infer information about a population from a sample of that population.”

“It was interesting that all of us had to calculate sample averages and that most of them were very close to the 75.2 mean.”

“It was interesting to see the bell-shaped curve come about as a result of our sampling.”

“I found it interesting that after everyone plotted their numbers it was clear that the sample and population means were the same. It all made more sense and was easy to understand.”

“I found it interesting that the sampling distribution and population means were exactly the same. I would have assumed similar but not exact.”

“I like how we actually took the mean of random samples to see that they produce a normal distribution.”

Two students liked how enthusiastic I was to be teaching them. One said I was well prepared. Two thought the review at the beginning was helpful.

“I thought you were very effective and easy to follow. Not boring at all and you seemed excited to teach us.”

“I liked the positive attitude of the instructor.”

“You were excited to be here.”

Thirteen students said that they were still confused about something or did not understand the practical aspect or main point of the lesson. I’m sure Professor Rauth will go over my points again. If I were the instructor I would be sure to address the confusion as soon as possible.

“I was a little confused about what finding the average of small random samples and plotting them exactly accomplished.”

“I thought the lesson described how to calculate and draw a population sample distribution well. The only thing I found unclear was what this could be used for in real life.”

“Sometimes the formal definitions can be confusing.”

“The final equation was confusing and I was unsure of its meaning, N(μ, σ/).”

Six students wanted more explanation of the mathematical language and definitions. Two of these specifically pointed out that they wanted to know more about sigma and the formula. I made sure to tell the third class that Professor Rauth would be going over sigma in detail in subsequent lessons.

“Spending a little more time on definitions and explaining them in easier terms might be helpful.”

“A better description of standard deviation, perhaps with a problem, would have been helpful.”

“Not everyone is a mathematics major so try to explain definitions in easier, less mathematical terms.”

Nine students said I went through the slides too quickly; they wanted more time to take notes. I made sure to tell the third class that this was a conceptual lesson and Professor Rauth would be going over the details again. I also distributed to each student a copy of my power point slides for reference.

“I thought that you went through the power point a little fast.”

“Slow down when explaining definitions of population distribution/sampling distribution.”

“Go a little slower in the PPT slides so we could have more time to take notes.”