To: Engineering Communications  
From: Patrick Austin (10-1)  
Date: February 24, 2017  
Subject: Core Capstone Defense – SLO #2 Rough Draft  
  
Patrick designed a computer simulation of several possible ways to organize lines for customers to wait to receive service at a business place such as a bank during the CS 301 Data Structures class at UNR. Patrick followed the seven-step process for designing an experiment to test the correctness of the program. Elements relating to engineering design rather than experimental design will be discussed in a later topic. The hypothesis was whether or not the simulation accurately simulated a line. The relevant variables were statistics about the operation of the line gathered during the simulation, like average wait time, average line length, and maximum line length. The level of treatment was confined to Patrick’s program and a set of small inputs, consisting of times of customer arrivals, where correct line behavior could be easily verified. Patrick controlled environmental and extraneous factors by limiting the number of computers and operating systems on which the program would be tested. Patrick designed the experiment to test the hypothesis by making the simulation output the relevant statistics to a file to be compared against expected values. This was done for each different type of line simulation and input file, effectively selecting and assigning subjects to groups. Patrick then pilot-tested and revised the structure of the statistic-gathering components of the program numerous times to improve correctness before conducting the final test. Finally, Patrick statistically analyzed the data gathered from the experiment on his simulation and compared it to expected values.  
  
Because of Patrick’s experimental design, he was able to analyze high-quality data which was fit to analyze in order to evaluate the hypothesis. This data completely, accurately, and consistently measured the operations of the simulation. In this case analysis consisted of verifying a match between the measured data and the expected data. Patrick was able to analyze any errors that arose in the data by identifying systematic errors caused by bugs in the code as well as measurement errors caused by rounding and the finite precision of variables in the simulation.