Stat 217 Winter 2008

Mini-project 2: Comparing Learning Styles (due Thur Mar 13)

You may work with one partner on this mini-project, handing in one report with both names, provided that you both contribute substantially to the project. Your report must be word-processed, although you may hand-write the more mathematical parts if you'd like. This report should consist of your answers to the following questions, as well as an introduction and conclusion.

This mini-project extends your analysis of learning style data from the previous mini-project. You will now compare your class results with those of my other two classes, which are more mathematical than our class.

The combined data can be found in a Minitab file called `MoreLearningStylesW08.mtw`, available from our course webpage. Notice that the first five columns are the same as before, except they now contain data for more students. A new column has been added, which indicates which type of class the student is from. (If you need a reminder about what the scores and categories mean, see the instructions for mini-project 1.)

Once again, as you work through this project, be sure to save your work often as a Minitab project file. Saving your Word file often is also advised. Start early enough that you have time to ask questions.

Issue 1: Active vs. Reflective Learning

(a) Produce and report a 2×2 table that displays the counts of students who are active vs. reflective learners, comparing the two types of classes. [*Minitab hint*: Use `Stat> Tables> Cross-Tabulation and Chi-Square` … and then enter `Act/ReflCategory` as the row variable and `Class Type` as the column variable.]

(b) Create a segmented bar graph of the active/reflective breakdown, comparing the two types of classes. [*Minitab hint*: Use `Graph> Bar Chart… (Stacked)`. Be sure to enter `Class Type` as the first categorical variable and then enter `Act/ReflCategory`. Make sure that `Stack categories of last categorical variable` is checked. Then click on `Chart Options` and select `Show Y as Percent` and also select `Within categories at level 1`. You can copy/paste this graph directly into a Word document. If you can not get this to work, you can create the segmented bar graph by hand, based on the table that you produced in (a).]

(c) Comment on your findings from this descriptive analysis in (a) and (b). Does it appear that students in these two types of classes differ substantially with regard to their active/reflective breakdown? [Remember to always relate your comments to the context.]

Now treat these two classes as samples from the populations of all students of these two class types.

(d) Conduct a two-sample significance test of whether the population proportion of active learners differs between these two types of classes. Report all components of the test: null and alternative hypotheses, test statistic, and p-value. Also report your test decision at the $\alpha = .05$ level. [*Minitab hint*: You may do this by hand, or use `Stat> Basic Statistics> 2 Proportions`… Click on `Samples in one column` and enter `Act/ReflCategory` as the samples and `Class Type` as the subscripts. Then click on `Options` and select `Use pooled estimate of p for test`.]

(e) Check and comment on whether the technical conditions for this test of significance are satisfied.

(f) Summarize your test conclusion.

(g) Report and interpret a 95% confidence interval for the difference in population proportions who are active learners. [*Minitab hint*: Minitab should have already produced this confidence interval when you performed the test in (d).]

Issue 2: Visual vs. Verbal Learning

Now analyze the quantitative data on visual vs. verbal learning style by answering the following questions.

(h) Produce histograms of these scores for each type of class (separately). [*Minitab hint*: Use `Graph> Histogram (Simple)`. Enter `VisVrbScore` as the variable, and then click `Multiple Graphs` … Then select the `By Variables` tab, and then enter `Class Type` as the `By variable` …]

(i) Produce boxplots of these scores for comparing the two types of classes. [*Minitab hint*: Use `Graph> Boxplot (One Y, With Groups)`. Enter `VisVrbScore` as the graph variable and `Class Type` as the categorical variable. If you want the graphs to appear horizontally rather than vertically, click on `Scale` and select `Transpose value and category scales`.]

(j) Report the mean, standard deviation, and five-number summary of these scores for each type of class. [*Minitab hint*: Use `Stat> Basic Statistics> Display Descriptive Statistics`. Enter `VisVrbscore` as the variable and `Class Type` as the `By variables`.]

(k) Comment on your findings from this descriptive analysis in (h)-(j). Does it appear that students at these types of classes differ substantially with regard to their visual/verbal scores?

(l) Conduct a two-sample significance test of whether the population mean score on the visual/verbal style differs between these two types of classes. Report all components of the test: null and alternative hypotheses, test statistic, and p-value. Also report your test decision at the $\alpha = .05$ level. [*Minitab hint*: You may do this by hand, or use `Stat> Basic Statistics> 2-Sample t…` Click on `Samples in one column` and enter `VisVrbScore` as the samples and `Class Type` as the subscripts.]

(m) Check and comment on whether the technical conditions for this test of significance are satisfied.

(n) Summarize your test conclusion.

(o) Report and interpret a 95% confidence interval for the difference in population mean scores on the visual/verbal style. [*Minitab hint*: Minitab should have already produced this confidence interval when you performed the test in (l).]