How to Write Lab-Assignment Reports: Alternative Approaches

(e.g., for Lab 1 assignment, you can have a title like “Colleges and Universities: Exploratory Data Analysis.” This is just an example, so you write it in your own words.)

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Author Note

You can include this section if you want to provide information about which assignment this is. You also would include information about how to contact the authors, sources of funding, conferences at which previous versions of the paper were presented, etc.

Abstract

Brief (no more than 120 word), comprehensive description of the article/study/assignment. Abstracts are also often required for conference proposals, so it will be good practice to try to put one together. However, for lab assignments, you can omit the abstract.

*Keywords:* APA Style, Assignments, Lab 3 write-up

**How to Write Lab Reports: Alternative Approaches (Level 1 Header)**

The purpose of this document is to let EDF5400, 5401, and 5402 students know what research papers look like and how statistical results are transformed from SPSS transcripts into readable documents. Begin with a brief statement of the general problem you are solving and why somebody might care. “Purpose paragraph(s)” introducing the topic/issue and why it is important to study usually go at the beginning. Often the first part of the paper will try to grab the reader’s attention. This introduction will preview the major theories and research studies that inspired the work and point out the gaps that you are trying to fill. It may also introduce the main purpose/goal of the study. We do not need to write a lot about the background theories for lab assignments. However, you may identify the audience and why your findings could be important to them in the beginning paragraphs. You would not talk about *statistical* significance in the introduction though.

A last thing to note is that the first header (above) is centered, bold, and written in “title case” where all major words are capitalized.

**Literature Review**

Here you’d write a brief discussion of relevant articles and works. For some of our labs, we won’t have many related articles. Usually this lit review sets the stage for your hypotheses. In manuscripts for publications this section is usually at least several pages long and describes the research and theories related to your study in some detail. (The header here, which is the second level of header, is “left justified” meaning it begins at the left margin of the paper. There is a second header of this type following this paragraph. You must use two or more headers at each level, or else do not use them at all. They are formatted using title case (and now bold according to the 6th edition; APA, 2010), as above.

**Research Question/Hypothesis**

This section should present a brief statement of what question you are trying to answer and what you expect to find. This section is where we present the *scientific hypothesis* and not the statistical null hypothesis. (If this is a study you want to send to a journal, this section would flow from the literature review.) You may notice that this header is at the top of a page. Try not to let a header be an “orphan” – i.e., if page 4 were one line shorter the header would be on page 4, with no visible sentences following it. You can use subheadings in your introduction section to help organize it, if you wish. As above, you must use two headers at each level.

**Sub-subheading format.** You can also have different levels of subheaders to help organize subordinate information. These sub-headers are formatted as in the beginning of this paragraph. This third level of heading has sentence capitalization (only the first word is capitalized) and ends with a period. The text of your paragraph follows directly after the period. However, you must use two sub-headers at each level. So we’d need to have another level-3 header to justify keeping the one we have above.

**Second header at level 3.** This would be the second main part of the description of the hypothesis.

**Methods**

**Data**

A brief description of the data is given, including what was the population and how were the data sampled. This should not be a click-by-click description of what you did in SPSS, but rather a more global data description. Make it sound like a real scientific study! In the 5400 lab assignments, the data were compiled or collected by somebody else. We need to cite the data source and summarize the key points of the data collection.

**Measures**

Describe your dependent variables (DVs) and predictor variables here. You may want to use a sub-header for each measure used. Note that this is critically important for the first lab, where this information will be needed later on to make sense of the descriptive analyses you will perform.

**Procedures**

Here you would describe how you collected data, the timeline of the study, etc. Since you won’t personally have collected data for most of the labs, you do not need to mention anything here, or you can describe how you think the data might have been collected. This section presents the details about how you did things that would help other authors to replicate your study (e.g., “the treatment was given during three 20 minute session”). This will help readers envision any limitations or strengths introduced by the procedures. APA also provides many helpful writing tips for this part of the work. We emphasize several of those in this course including the following: use simple active grammar, use terms consistently, and minimize the use of the first person and passive grammar when possible. However, please don’t write “the researcher did X” if you are the researcher. It is often clearer to write “We administered the test” rather than “The researchers administered the test” (which ones??) or “The test was administered by researchers.”

**Analysis**

Some descriptive statistics about the data are followed by the results of the formal hypothesis test(s). Often you will include graphs and tables to highlight what you observed. You should include a test statistic, *p* value and effect size. Along with the results of statistical tests, you usually report the descriptive statistics, such as means and standard deviations (put those first), and then the test statistic, degrees of freedom, obtained value of the test, and the probability of the result occurring by chance given the null model (*p* value). Here is a random table of results. However it has several problems! First the font differs from that used in the text, and the title is not consistently capitalized. The variable names (which are also capitalized differently) and parts of the table appear to be cut-and-pasted from SPSS. Also the table is not in APA format. The second version of the table is better.

**TABLE 1**

**Descriptive Statistics of Teacher Community on the Reading/Math achievement Outcome**

|  | *N* | *M* | *SD* | *Skewness* | *Kurtosis* |
| --- | --- | --- | --- | --- | --- |
| Reading/Math achievement Composite (Base Year) | 814 | 51.97 | 6.59 | -.07 | .21 |
| Teacher Community (High values=lots o' community) | 827 | .22 | 6.30 | -.20 | .45 |
| STANDARDIZD TEST COMPOSITE (READNG,MATH) | 828 | 51.35 | 6.32 | -.01 | -.00 |
| Valid N (listwise) | 811 |  |  |  |  |

Table 2

*Descriptive Statistics* for Teacher Community and the Reading/Math Achievement Outcome

|  | *N* | *M* | *SD* | *Skewness* | *Kurtosis* |
| --- | --- | --- | --- | --- | --- |
| Reading/Math achievement composite (Base Year) | 814 | 51.97 | 6.59 | -.07 | .21 |
| Reading/Math achievement composite (Follow-up Year) | 828 | 51.35 | 6.32 | -.01 | -.00 |
| Teacher community | 827 | 0.22 | 6.30 | -.20 | .45 |

*Note.* High values on the teacher community scale reflect a stronger sense of community.

Test statistics and *p* values should be rounded to two decimal places in most cases. All statistical symbols that are not Greek letters should be italicized (*M, SD, t, p,* etc.). When reporting a significant difference between two conditions, indicate the direction of this difference, i.e., which condition was more/less/higher/lower than the other condition(s). You will note that significance levels in journal articles--especially in tables--are often reported as either "*p* > .05," "*p* < .05," "*p* < .01," or "*p* < .001." Also, APA style dictates reporting the exact *p* value within the text of a manuscript, i.e., *t*(33) = 2.10, *p* = .03. If your exact *p* value is less than .001, it is conventional to state merely that *p* < .001. If you report exact *p* values, state early in the results section the alpha level used as a significance criterion for your tests, i.e., “We used an alpha level of .05 for all statistical tests.”

Again in Table 2 we have another problem. A great way to LOSE points from your lab report is to present results like those below. It is technically wrong to say “sig = 0” – *p* values can NEVER be actually zero.

**TABLE 3**

**ANOVA of Race Comparisons on the Science Standardized Score Outcome**

| *Model* | *Sum of Squares* | *df* | *Mean Square* | *F* | *Sig.* |
| --- | --- | --- | --- | --- | --- |
| Regression | 2757.37 | 5 | 551.47 | 6.11 | .00 |
| Residual | 11370.38 | 126 | 90.24 |  |  |
| Total | 14127.75 | 131 |  |  |  |

*Note*. Predictors: (Constant), Socio-economic Status Composite, Asian, Black, Hispanic, White.

*p*<.01

With the exception of some *p* values, most statistics should be rounded to two decimal places. Regarding how to put the information in detail on the final lab, refer to the appendix.

**Conclusions**

Describe what the statistical results mean in terms of the larger problem. Don’t just repeat the results of the statistical procedures, but draw them up into the context of the larger problem. Speculate about whether or not you can generalize from the conclusions. A discussion usually includes a summary of your findings and then an interpretation of what they mean. Try to connect back what you found to the existing research and theories. You also point out the strengths and weaknesses of your own study and make suggestions for future research. These activities will help you anticipate problems with conducting your study and interpreting your findings realistically.

This template was prepared for the lab assignments by our former TA Jiwon (Alice) Nam, therefore you will have to double check the model for reporting that is available on the APA (2009) website (<http://www.apastyle.org/manual/related/sample-experiment-paper-2.pdf>).

The point of formatting is to make your lab assignments neat and well organized, and to show professionalism. If you work in another field with a standard formatting system, you may use that system instead, but for most of you APA formatting is either required or very close to what is required in your field.

References

All citations in the text should be referenced alphabetically here, in APA (2010) style. The first line should be left justified, with the following lines indented half an inch, as demonstrated below.

American Psychological Association. (2009). In *Learning APA style* (6th ed.). Retrieved from http://www.apastyle.org/learn/index.aspx

American Psychological Association. (2010). *Publication Manual of the American Psychological Association* (6th ed.). Washington, DC: Author.

Kahn, J. (2010). *Reporting statistics in APA style* from <http://my.ilstu.edu/~jhkahn/apastats.html>.

Psychology Writing Center at University of Washington. (2005). *Reporting results of common statistical tests in APA format.* Downloadedfrom <http://depts.washington.edu/psywc/handouts/pdf/stats.pdf>.

Table

Tables, if you have any, should be in APA (2010) style. These can be embedded in the text as was do above, or tables can appear after the references, with each table on its own page. Following all tables, any figures are presented in APA style, one per page. The APA style for figure captions, as well as table titles, notes and line formatting are very specific. Please refer to your APA style guide or the corrected example paper (<http://www.apastyle.org/manual/related/sample-experiment-paper-1.pdf>).

Appendix

Reporting Statistics in APA Style

**Mean** and **Standard Deviation** are most clearly presented in parentheses. Example: The sample as a whole was relatively young (*M* = 19.22, *SD* = 3.45). The average age of students was 19.22 years (*SD* = 3.45).

**Percentages** are also most clearly displayed in parentheses with no decimal places. Example: Nearly half (49%) of the sample was married.

**When *t* tests** are reported, only the degrees of freedom are in parentheses. Following that, report the *t* statistic value (rounded to two decimal places) and the significance level. Example: There was a significant effect for gender, *t*(54) = 5.43, *p* < .001, with men receiving higher scores than women.

**ANOVAs** (both one-way and two-way) are reported like the *t* test, but there are two degrees-of-freedom numbers to report. First report the between-groups degrees of freedom, then report the within-groups degrees of freedom (separated by a comma). After that report the F statistic (rounded off to two decimal places) and the significance level. Example: The main effect for treatment was significant, *F*(1, 145) = 5.43, *p* = .02, and a significant interaction, *F*(2, 145) = 3.24, *p* = .04.

**Correlations** are reported with the degrees of freedom (which is *N*-2) in parentheses and the significance level. Example: The two variables were strongly correlated with *r*(55) = .49, *p* < .01. Alternative example: Test score and level of teacher community showed a strong correlation of r = .49 (*df* = 55; *p* <.01).

**Regression** results are often best presented in a table. APA doesn't say much about how to report regression results in the text, but if you would like to report the regression in the text of your Results section, you should at least present the unstandardized or standardized slope (beta), whichever is more interpretable given the data, along with the *t* test and the corresponding significance level. (Degrees of freedom for the slope *t*-tests are *N-k-1* where *k* equals the number of predictor variables.) It is also customary to report the percentage of variance explained along with the corresponding *F* test. Example: Social support significantly predicted depression scores, *b* = -.34, *t*(225) = 6.53, *p* < .001. Social support also explained a significant proportion of variance in depression scores, *R*2 = .12, *F*(1, 225) = 42.64, *p* < .001.

**Tables** are useful if you find that a paragraph has almost as many numbers as words. If you do use a table, do not also report the same information in the text. It's either one or the other.

**More EXAMPLES…**

**Reporting a significant single sample t-test (μ ≠ μ0):**

Students taking statistics courses in Educational Psychology Learning Systems at Florida State University reported studying more hours for tests (*M* = 121, *SD* = 14.2) than did FSU college students in general, *t*(33) = 2.10, *p* = .034.

**Reporting a significant t-test for independent groups (μ1** ≠ **μ2):**

FSU students taking EDF5400 in EPLS had higher IQ scores (*M* = 121, *SD* = 14.2) than did those taking the course in control group (*M* = 117, *SD* = 10.3), *t*(44) = 1.23, *p* = .09.

**Reporting a significant omnibus F test for a one-way ANOVA:**

An analysis of variance showed that the effect of noise was significant, *F*(3,27) = 5.94, *p* = .007. Post hoc analyses using the Scheffé post hoc criterion for significance indicated that the average number of errors was significantly lower in the white noise condition (*M* = 12.4, *SD* = 2.26) than in the other two noise conditions (traffic and industrial) combined (*M* = 13.62, *SD* = 5.56), *F*(3, 27) = 7.77, *p* = .042.