1 Writing

1.1 Level of Detail

For scientific writing. It is important that anyone reading the paper/thesis should be able to replicate your work. Anything that is needed to replicate the work must be included somewhere in the thesis. Depending on the importance of the detail, it might be in the main text, in a footnote or remark, or in some supplementary material. For deciding where it should go, it might help to distinguish three types of details:

1. Objectives and key ideas — what we are trying to achieve.
2. Details that need to be the way they are for good reason. These should be explained — why do we need to choose them this way. Getting these details wrong will usually lead to a different conclusion.
3. Details that are relatively arbitrary, but a choice needs to be made. For example, the number of simulations to run. If these details are changed, we would expect the results to be a little different, but the main conclusions should be the same.
4. Implementation details, such as what software was used. These details should in theory not affect the results at all. They still need to be included in case any problems are identified with the package, and to give credit to the maker of the package.

They are in this order of importance. The idea is that given the objectives and key ideas, an experienced researcher should be able to fill in the rest in a reasonable way to reach the same conclusions. The details that need to be a certain way for good reason help to explain the problem and the approach, and lead to increased understanding, so should be emphasized. Details that are relatively arbitrary are mostly only important if someone actually wants to repeat your work. Implementation details are largely of use only if some problem is identified in the work.

1.2 Structure

Having explained the different levels of details, we now look at how the writing should be structured for best exposition. Since the objectives and key ideas are enough for an experienced researcher to essentially repeat the work, they should be put at the start of each section. After reading the first paragraph of each section, an experienced researcher should be able to write the rest of the section. By putting the key ideas at the start of the section, everything in the section can be seen in light of these ideas, so should make more sense.

1.3 Summarising Results, Scenarios, etc.

The results are all in the tables and figures. Your summary should not be a restatement of what the reader can see there. Instead, you need to add some interpretation. Restating results should only be done when it adds interpretation to the story you are telling. For example:

> The slope of the line in Figure 1 is greater than the slope of the line in Figure 2.

Is immediately obvious to any reader who bothers to look at the figures, and so adds nothing. On the other hand:

> The slope of the line in Figure 1 is greater than the slope of the line in Figure 2. This implies that happiness is influenced more by health than by wealth.

Adds a layer of interpretation. The first sentence highlights what aspect of the figure allows us to reach the conclusion, and the second sentence provides us the conclusion of interest. When summarising results, the reader should know why you are highlighting the features you describe.

Figures and tables should be self-contained. All information explaining the meaning of the figure or table (e.g. what colours represent, how to read the table/figure, etc.) should be in the caption or legend of the figure or table, and *nowhere else*. It is completely unhelpful to know what colour represents what when not looking at a figure.

I suggest the following approach to summarising results:

1. Find one or several key conclusions from the data. These should be things that you could tell someone who has not looked at your thesis at all. Examples include:

   - Students at later stages of their degree are on average better at writing up results.
   - There is a large variation between the writing abilities of different students.

   These do not need substantial context from your thesis to understand, and represent real conclusions. The conclusions from the data might be more technical, and need a little more context: such as

   - My method is better than other available methods for this type of data.
   - If the method is allowed to run longer, the results initially get better, but reach saturation usually after 10–20 iterations.

   But they should stand without any reference to the exact experiment or simulation that was carried out.

2. Having identified the conclusions you plan to make, identify the features of the data that lead to these conclusions. For example:

    - We see there is positive correlation between time spent in degree and writing quality, indicating that students at later stages of their degree are on average better at writing up results.
    - The R^2 in this example is low, indicating that there is a large variation between the writing abilities of different students.

3. Do not mention anything about the results that are not used in making a conclusion.

1.4 Length

The thesis should be exactly as long as it needs to be to explain what is needed. Don't try to make it longer by saying things that don't need to be said. For each sentence, ask what information it gives, and if it doesn't give any new information and ideas, then remove it. Excessive repetition is bad. Occasionally reminding the reader of some important point that was mentioned earlier is helpful, but it should be obvious why this point needs to be recalled here.