**Student Experiment Report Scaffold v2 10 BSEP ATAR Prep Mr Colyer 2024**

**It’s a checklist**, so tick each item off when you are sure that you have included it in your report!

The purpose of this document is to provide you with detailed information on what should be included in each section of a student experiment report. It also enables you to judge the quality of your draft: **You** need to proofread your draft, and check that you have included each item mentioned in this list. If not, please keep working!

For **individual feedback** on your draft, please email me to organise a time to do this. This could help you if:

**Please do not stop working on your report, while waiting for draft feedback! Stop when your report is finished!**

* you are unsure of how to include something from this checklist in your report

**Please do not stop working on your report, while waiting for feedback! Stop when your report is finished!**

* you would like confirmation that what you have included meets the required standard, etc

Style Guide:

* Use the headings in **bold** below, for your report.
* Report should use formal scientific language, in the third person: do not use personal pronouns, such as “I” and “we”.

Title:

* Clear and descriptive of the experiment.

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**Rationale**

The rationale shows application of scientific concepts relevant to the original and modified experiments and chosen research question.

* Write as a logical progression of theory, from most general to most specific
* *Explain* all important scientific concepts that apply to the chosen experiment/research question/modified method/etc
* Briefly *describe* the original experiment, explicitly linking it to the theory presented (mention all aspects that are directly relevant to your research question/modifications, such as aim/methods/equations/

***Explain***: make an idea or situation plain or clear by describing it in more detail or revealing relevant facts; give an account; provide additional information

formulas/results, etc)

* Briefly *evaluate* the original experiment, to identify potential modifications
* Include theory which *justifies* (provides a reason for) and/or *explains* the modifications made to the original experiment
* Also *justify* your modifications, by relating them to the purpose/reasons for the modified experiment
* Show how the modifications lead to the development of a research question

**Research Question**

* The research question is connected to the rationale – it is a natural progression from the theory and original experiment
* The research question is clearly defined, specific and detailed
* The independent and dependent variables are clearly stated

**Methodology**

**Original Experiment**

* Brief summary of the original experiment - can be as a dot point list, or written in paragraphs
* Include diagrams of your apparatus/experimental setup where appropriate (to make understanding this more simple)

**Modifications to Methodology**

Modifications can be written as bullet points, in a table or in paragraphs

**Refined by:**

* Describe each modification to the original experiment
* Clearly justify how each modification refines the experiment by improving the *reliability* and/or *validity* of the experiment:
  + *Reliability* depends on *precision:*
  + *Precision*: refers to how repeatable the results are, or how close together/similar each result from the same treatment group are. Improving precisionwill mostly depend on changing your experimental design to reduce random errors: better control of variables, collect and measure results repeatedly, etc.
  + *Validity* refers to whether or not your results allow you to answer the research question you asked. It partly depends on accuracy:
  + *Accuracy*: refers to how well the results match the actual (or theoretical) result. This will often depend on equipment limitations, such as the measurement scales on glassware, calibration of equipment, etc. You can improve accuracy of results by reducing systematic errors.
  + Improving validity also depends on your experimental design – for example, could you choose treatment groups more appropriate for answering your research question?

**Extended or Redirected by:**

* Describe each modification
* Clearly justify how each modification *extends* or *redirects* the experiment

*Extend* (collect more information): The modification could extend the experiment by:

* collect more detailed data on an original independent variable, perhaps by adding more treatment groups
* eliminate some of the original treatment groups

***Treatment group***: a treatment group consists of all observations/participants of one value of the independent variable, eg all measurements taken at room temperature; or all people receiving a certain drug.

*Redirect* (collect different information): Modifications could redirect experiment by:

* Testing a new/different independent variable

**Safety and Ethical Considerations**

* A dot point list, or table
* Identify the risks, ethical and environmental issues associated with experiment.
* Discuss how each risk/issue will be managed during experiment

**Processed Data and Calculations**

* Include tables and graphs, of collated/summarised data only, all raw data is placed in an appendix
* All tables and graphs have a descriptive caption (caption above tables, below graphs)
* For any calculations, *only one* set of working is required in this section – any repeated calculations should be included in appendix

In senior, this will also include identification of uncertainty and limitations of evidence

**Analysis of Evidence**

* State trends, patterns, relationships, anomalies – state actual data, & any necessary theory, to support statements
* Mention any important results

**Evaluation of Experimental Processes**

**Sources of error affecting reliability:**

* Describe each major factor/error which affects the reliability of the experimental process/results. Errors should be identified as either random, discuss how they affect precision; or systematic, discuss affect on accuracy.
* Clearly discuss how each factor/error reduces the reliability of the results
* Your discussion of reliability must include both *precision* and *accuracy.* Results are *precise* if each time you replicate the experiment, you get a very similar result. Results are *accurate* if they match the theoretical result. (see Modifications to Methodology section above for definitions/more information on precision and accuracy)

**Sources of error affecting validity:**

* Describe each major factor/error which affects the validity of the experimental process/results. Validity refers to whether or not your results allow you to answer the research question asked. This usually depends on your experimental design – for example are your chosen treatment groups appropriate for your research question?

**Suggested Improvements and Extensions**

* Should be a logical progression from your evaluation above – for each source of error, you should suggest an improvement that would eliminate/reduce this source of error
* Justify how improvement would help improve the experiment

**Conclusion**

* Restate research question
* Provide justified conclusion/s, linked to the research question - discuss the results of your experiment, and what answer they give to your research question.

**Reference List**