RESEARCH ASSIGNMENT – simple guide

Research and Planning

* considered rationale identifying clear development of the research question from the claim
  + a specific and relevant research question
* selection of sufficient and relevant sources.

General tips: The rationale is more important in your research assignment (compared to the student experiment); simply because there are only three criteria in the planning category for the research assignment.

“selection of sufficient and relevant sources” - You should try to make sure you get this criterion by using at least three data sets which come from at least 2 different sources, using several references in the rational (ideally extra ones outside your sources), and ensuring that the data completely covers the breadth of the research Q.

**Rationale**

The basic structure of the rational is to start with a first para which very broadly covers the “big picture” of your research Q. This can be hard to identify, but usually (not always) the dependent variable in your research Q is where you start. Discuss this idea in class, your teacher can use some examples to show how this works.

In your second para (or within the first) you need to build a link between your independent variable and the claim statement. “Clear development” means that a teacher can see how something as general as the claim can be reduced to something as specific as the research Q.

Once you have established the importance of your dependent variable, you need to introduce the idea that it can be affected by your independent variable. This is usually done in a third paragraph.

“considered” will generally mean you have communicated clearly all the relevant background need to interpret your research Q.

**Research Q**

Be specific here – check with the teacher!

**Data sources – Intro and the data**

Briefly introduce each set of data and then show the data. These reason for the introduction is to establish the quality of the evidence and argue it is sufficient. This will be important for later on in your assignment (in limitations and Quality of the evidence).

**Analysis and Interpretation**

* + the identification of sufficient and relevant evidence
  + thorough identification of relevant trends, patterns or relationships
  + thorough and appropriate identification of limitations of evidence
  + justified scientific argument/s.

There are four criteria in this section, BUT you only directly address two of them (identifying trends, and limitations), so there are only two heading in this section. The other two trends are indirectly done as part of “Identification of trends”. So how do you make sure you get these two “extra” criteria? The first criterion is discussed below, the last criterion is discussed at the end of this section.

The first criteria is “identification of sufficient and relevant evidence”. The sufficient part means that when you identify the trends, you need to cover all of the research Q or there is “not sufficient evidence”. The relevant part means that when you identify the trends, you focus only on data that is specific to your research Q and you clearly explain its relevance (this is usually done in the interpretation part, see below)

**Identification of Trends and relationships**

For each data set write a paragraph for each trend or relationship you identify. Each paragraph should have the same structure as the criteria is the same for all identifications.

Each para has three parts. First state the trend as simply as possible. You will almost certainly need to elaborate or explain this simple sentence as your trend is likely to be more complicated than can be described properly in a single sentence. Avoid the temptation to write one massive complex/compound sentence. Secondly, use data from the data set to support the identification of your trend. Again, you may need several short sentences showing how the data supports your identification. Thirdly, write down a real-world interpretation of this trend. This is where you get the “relevant” mark in the first criteria. This will also be useful later as you will use this implication to support your conclusion. *Did I already mention that short sentences are more effective at communication than long compound sentences*?

**Limitations of the evidence (uncertainty/reliability and limitations/validity)**

This is a complex topic and relies on your understanding the data set AND the source it came from. Limitations here (in your research assignment) has a different meaning to the way this word is used in your student experiment. In the student exp it was used to evaluate validity, but here it is a far broader meaning. You can consider limitations of the data to cover any problems you can see in the quality of the data.

That should make it easy for you, but there is no easy formula to follow here. Each data set and source will have its own limitations – you just have to identify them and explain each of them one at a time.

If you have difficulty finding problems with your data, maybe reframe the idea of limitations into the simpler ideas of uncertainty (and thus reliability), and limitations (and thus validity) that you used in your student experiment.

**NOTE:** there is an entire criterion here for “justified scientific argument”. That is why I suggest you use data to support your identification of trends. In the limitations section, every time you identify a limitation, make sure you explain why you decide that limitation exists. Doing both of these will get you the “justified scientific argument” criteria. Of course, you have to be right as well!

**Conclusions and Evaluation**

* justified conclusion/s linked to the research question
  + insightful discussion of the quality of evidence
  + extrapolation of credible findings of the research to the claim
  + suggested improvements and extensions to the investigation that are considered and relevant to the claim.

There are four criteria in this section and you should have a heading for each one as you address each criterion directly.

**Conclusions**

You should be able to make a conclusion which is based on all of your data sets. State this simply, then elaborate or explain if you need to.

In the same para, explain how each of your trends (not data) support this conclusion. Here you will use the trends themselves, OR more likely use the implications you wrote for each trend. This is important as this is you get the “justified conclusions” mark.

At the end of this para, or in a second one, explain how this conclusion addresses the RQ. This is how you get the “linked to the RQ” mark.

REPEAT for each conclusion you have, but you are likely to only have one, maybe two.

**Quality of the evidence**

You have a choice about how you do the quality of evidence part. You can discuss all the data together as one, or have separate discussions on each data set. I recommend the second approach as it is easier.

Start very broad here with an evaluation of the quality of the journal the articles were published in. If they were in a per-reviewed journal, then you can state that, and that the data has been judged by its peers to be high quality data, or at least data that has been collected with a high-quality methodology. If you journal is not a peer reviewed journal, then you must say this, and judge the overall scientific quality of the journal.

Secondly, you can look at the methodology to see if there are issues. Sounds difficult, but your earlier work in limitation of the evidence is used here. Do the limitations you identified in each data set mean that that data set is high or low quality?

**Extrapolation to Claim**

This is a short section. It is very unlikely your conclusion can be extrapolated to the entire claim statement. You simply need to state how the conclusion relates to the claim, and also how it does not support the claim statement. Usually your conclusion does support the claim (or contradict it), but only in a very limited sense. The claim is broad, your conclusion is specific.

**Improvements and Extensions.**

Need a minimum of two improvements and two extensions. More does not get you higher marks. Be very clear to get these correct.

Improvements should relate directly to the limitations you identified in the data, so use the limitations (from earlier) to figure out what improvements you could suggest. In theory, every limitation you identified should lead to an improvement you could suggest, but you only need two improvements, so don’t go overboard. State an improvement, explain why it is an improvement; repeat for next improvement.

In the next paragraph, state an extension, explain why it is an extension, repeat. Extensions are harder for a teacher to help you with. Generally, consider areas of research outside your Research Q, but inside the claim statement.