

Common Limitations to Investigations

Limitations

A limitation is any factor that has not been controlled or taken into account in the design of an experiment can be referred to as a limitation. A limitation can be described as a design fault. Limitations will reduce the confidence you can have in the conclusions you draw from your investigation.

(Errors like “Oops, I didn’t stop the timer!” are different - if you make a mistake this doesn’t count as a limitation. You need to fix your mistake and redo your data collection!)

The limitations will obviously depend on the investigation you carried out but here are some common ones. Ensure that you discuss them in the context of your investigation.

- Were a limited number of values for the independent variable investigated?
 - Imagine you wanted to investigate the effect of pH on something. You investigate pH 4,5,6,7 and 8. This is a limited range and so you could not conclude what the impact of lower or higher pHs would be. Also intermediate values should be investigated to more accurately determine where the optimum pH is. Intermediate values are good for confirming any trend, giving a more complete picture of how one thing affects another, and if a change occurs (eg an increase, decrease, plateau) you can more accurately say when this occurs.
- In investigations that involve gas collection, like an exhalation – could gas be escaping from the apparatus at any point? This would cause the volume data to be lower than it should be.
- Were any important factors not controlled? Consider all the factors that affect the performance of your skill or task. They should all be controlled unless used as the independent variable.
- Were investigations carried out at optimal conditions? You may control temperature but if it is too low, it may not give you accurate results. This will make it harder for you to make judgements about whether the independent variable is having an effect.
- Does any part of the investigation involve making judgments, such as color, scoring a performance, etc.? These are subjective judgements (based on opinion) and so could vary each time you make an observation. Could a comparison chart or electronic device be used instead? This would increase the accuracy of measurements.
- Did the precision of your apparatus lead to uncertainties you consider to be unacceptable? If uncertainties are large it is more likely that data for each of the independent variable values could overlap. If they do then you can’t confidently say that there was a real difference between them. An improvement could be to use more precise apparatus.
- A small number of repeats (or none at all) is problematic as it reduces your ability to judge reliability. More repeats help you identify anomalies and omit them if necessary. More reliable data means that you can have more confidence that mean data is accurate.
- If sampling- was your sample size large enough to be representative of the population or area? A small sample could mean that you are not getting a true impression of a characteristic or area.

- If sampling- were there temporal, special, or safety constraints that stopped you from sampling in the ideal place or time?