Evaluating scientific investigations

Measurements can be precise, without being accurate. Some publications use the terms ‘internal reliability’ and ‘precision’ synonymously, while using the term ‘external reliability’ to define the consistency of measurements across experiments. Validity is a holistic evaluation of scientific investigations and relies on all aspects of investigations to be accurate or precise and reliable. An unreliable investigation cannot be valid, but a reliable investigation may be invalid if it does not address the question under investigation. The definitions of accuracy, precision, reliability, and validity described above are consistent in science, engineering, and statistics. However, publications in the fields of psychology, education and sociology research use the descriptions in different contexts. For example, ‘accuracy’, ‘precision’ and ‘internal reliability’ are used interchangeably.

The following table references the [Science Year 7-10 Syllabus](https://educationstandards.nsw.edu.au/wps/portal/nesa/k-10/learning-areas/science/science-7-10-2018/!ut/p/z1/rVPLcoIwFP0WFywzuQmB4BIflVqtVkuVbJwI0eIjIDJq-_WFTtud0I7NKpk5r9ycYIHnWGh5itcyjxMtd8U5EPaC3XsAJtCBY3cYPLUJ6baoNem1GZ59AqhLbOIx8jDqOQTc5xGxaZ_TkW9hUfIJ7RHi0CFwysGdjNvjjndHYWB98eHKcuF3_AqAqM7_ggUWoc7T_BUH6XkRJjpXOjcgzZKNCnN0VksDtDpKA7aIgAE7JTMd6zWSmZJHA45hrHSofjaIFzBEgTildBrGEQ6YbUbLiBLkrJpLxHjTQhIYQTYo6hAZ8bD5PcqKrKJ6UrPSr-Yx6jSCIgO_noHj2SlWZ-zrJNsX9Zj-8YpencOU3uhQI2_dKN-v61PxYeLN4SDcolVllS45nv93rdK97_t7x3xD29Wwa7Kgf3pvPSIRuI3GByoo2EI!/dz/d5/L2dBISEvZ0FBIS9nQSEh/?urile=wcm%3Apath%3A%2Fpw_content%2Fproject-web%2Fnesa%2Fk-10%2Flearning-areas%2Fscience%2Fscience-7-10-2018) © 2018 NSW Education Standards Authority (NESA) for and on behalf of the Crown in right of the State of New South Wales.

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| Term | Definition | Synonym | Notes |
| Accuracy | The extent to which a measured value agrees with its true value (namely - reference value). | Exact | Requires prior knowledge about the measured variable (that is - reference values) |
| Precision | The extent to which multiple measurements, made under identical or similar conditions, agree with each other (namely - variations within a dataset). | Internal reliability  Dispersion  Spread | Measurement precision: applied to repeated measurements in a single experiment.  Instrument precision: the precision of measuring devices (analogue and digital) |
| Reliability | The extent to which the findings of repeated experiments, conducted under identical or similar conditions, agree with each other. | Consistency  Repeatability  Reproducibility  Stability | In some disciplines, the term ‘external reliability’ is used. External reliability, like reliability, refers to the reliability of measurements across multiple experiments |
| Validity | The extent to which an experiment addresses the question under investigation. | Internal validity | Some disciplines use the term ‘external validity’ to refer to the extent to which the results of a study can be generalised (for example extrapolated). |