

Reliability, validity and accuracy essay sample



(To be read in conjunction with an article originally published in Curriculum Support, Science, 2001 Vol. 6 No. 3) Reliability and validity are two terms that continue to cause problems for teachers and students. Students in Stage 4/5 are required to evaluate evidence for reliability and validity. In Stage 6 they are required to discuss and explain how they would improve the validity and reliability of a first-hand investigation. They could also be asked about the validity and/or reliability of secondary sources of information. With reference to first-hand data the glossary of terms on pages 76-78 of the Science Years 7-10 Syllabus defines the terms validity and reliability as follows: validity of first-hand data The extent to which the processes and resultant data measure what was intended. reliability of The degree with which repeated observation and/or measurements taken under identical circumstances will first-hand data yield the same results.

When discussing the accuracy of measurements a dictionary definition such as that provided in the Australian Oxford Dictionary is appropriate: accuracy The exactness or precision of a measurement; relating to the degree of refinement in measurement or specification

First-hand investigations:

In the context of students planning first-hand investigations, issues related to accuracy, reliability and validity will impact on the choice of the measuring device and how confident you are about the conclusions drawn from the results of the investigation. The need for accuracy of data should influence the choice of equipment for conducting first-hand investigations.

Where data is collected, quantified or evaluated, reliability refers to the ability of the data gathering process to provide results that are consistent and within expected ranges. It is important that we encourage students to predicted expected results and even predict expected results and ranges of data. Validity relates to whether the measurements you are taking are caused by the phenomena you are interested in. The relationship between reliability and validity can be confusing. Measurements and other observations can be reliable without being valid. A faulty measuring device can consistently provide a wrong value therefore providing reliably incorrect results.

However, measurements and observations cannot be valid unless they are reliable and accurate. It is easier to be confident of your conclusion in any investigation when there are limited variables involved and where these variables are controlled. It is possible to highlight the difficulties involved in such decisions when you think about the difficulty in establishing the link between smoking and lung cancer and the link between mesothelioma and asbestos dust. The more complex the situation in terms of the range of potential variables that need to be controlled and the difficulty in controlling these variables, the less certain it can be that one test will deliver a valid and reliable answer.

Collecting data from secondary sources:

When students have to assess the reliability and validity of information and data from secondary sources, the best procedure is to make comparisons between data and claims of a number of reputable sources. In determining

validity, students might consider the degree to which evidence supports the assertion or claim being evaluated. In some cases, students may be able to make observations or conduct experiments to confirm the reliability and validity of the information they have identified. Some good questions to ask: first-hand information and data secondary information and data reliability Have I tested with repetition? How consistent is the information with information from other reputable sources? Is the data presented based on repeatable/repetition of processes? validity Does my procedure experiment actually test the hypothesis that Do the findings relate to the hypothesis or problem? I want it to? Have all variables been identified and controlled?