

PURPOSE

In this section teachers explain the reasons why they decided to research an area. The teacher studies were all informed by existing controlled evidence from the science of learning and teachers were given a text to read (Churches, Dommett and Devonshire, 2017), training day and feedback on their research proposals (which they turned into a **research protocol**).

A research protocol is a detailed research plan.

References follow the **Harvard system** – author names and date of publication appear ‘in text’ (e.g. Churches and Dommett, 2016, or as in paragraph at left) and the full reference elsewhere in the poster, as below:

Churches, R. and Dommett, E. (2016) *Teacher-Led Research*. Crown House.

Churches, R., Dommett, E. and Devonshire, I. (2017) *Neuroscience for Teachers*. Crown House.

THE RESEARCH DESIGN

Figure 1 illustrates the simplest form of **randomised controlled trial** (RCT). However, there are many types of RCT.

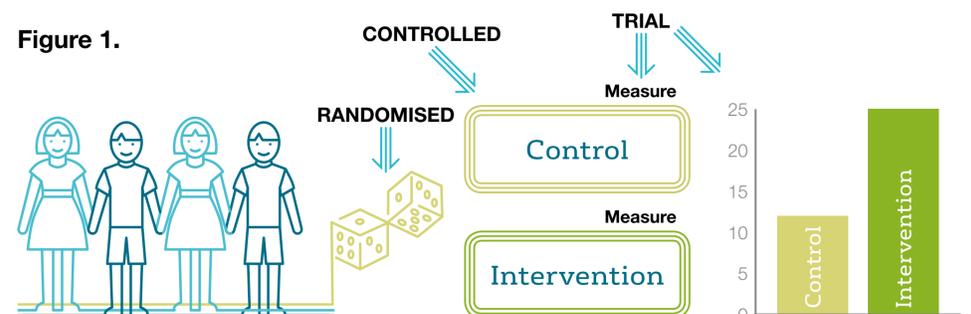
Between-participant – pupils divided into two groups that each experience a different teaching approach (or **condition**).

Within-participant – all pupils experience all approaches but in different orders (counterbalancing). It is usual to **counterbalance** the order in which things happen in this type of design, in order to balance out effects that might transfer from one condition to another (**carryover** or **order effects**).

Matched-pair (or case-matched) – similar pupils are paired and each member of the pair randomly allocated.

2x2 factorial design – a design in which four things can be compared against each other, simultaneously.

Figure 1.



The independent variable is what the experimenter explores and ‘manipulates’. **Levels of the independent variable** refer to the number of conditions created to do this. As you will see from the posters, some teachers have tested two things at once, others three or even four. The **dependent variable** is the measure or test that was used.

METHODS

In this section the researcher describes what took place and who was involved. You will see that different forms of randomisation are referred to. The researcher may also mention things such as the trial’s **mundane realism** (‘everyday-ness’), or whether participants and teachers were kept **blind** to the purpose of the research.

Simple randomisation – no control over the randomisation.

Stratified randomisation – a balance of pupil characteristics has been ensured across conditions.

Cluster randomisation – whole groups randomised together.

RESULTS

In a **pre- and post-test design** one way to analyse the results is to calculate the change in each pupil’s score and use this to assess progress (other methods are possible).

Gain scores were first calculated from pre- and post-test scores (Figure 2).

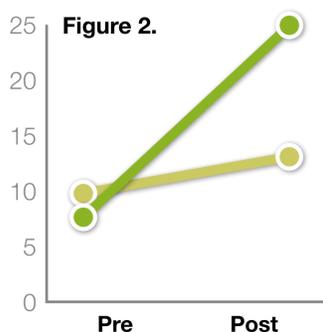
A one-tailed independent samples t-test showed that the intervention had a significant ($p = .01$) positive effect ($d = 0.63$) compared to the control condition (CI (95%) = 0.40 – 0.83).

Different tests are used to calculate the **probability** that the result may have occurred by chance (.01 is a one in a hundred probability). The test used depends on the design and types of data you have.

One-tailed means the researcher was predicting the result in their hypothesis, two-tailed that they were not (this affects the final p-value).

Where three things are compared an extra test is first done on the overall pattern to deal with what is known as **family-wise error**.

A finding is **significant** if it crosses a certain threshold (**alpha**) – this is usually .05 but can be set smaller, if the researcher wants or needs to be more rigorous (e.g. when comparing more than three things at once).



Effect size is the strength and direction of the change. This can be positive or negative. Different effect sizes are used for different data (d , r , $np2$ etc.).

The confidence interval (CI) is an estimate of the range of effect size that you might expect in 95 out of 100 replications of the study.

LIMITATIONS

There is no such thing as a perfect experiment. Here the researcher points the reader to the main issues that may have affected the results.

CONCLUSIONS

A verbal description of the results and an interpretation of what they might mean. In a longer journal article there is a discussion section and conclusions.