

Survey of Math Ideas

In the analysis of the two articles written by Hrabowski, certain statistical terms are used:

F-test

The F-test is a technique that is usually used for testing numerical data, not proportional data. Proportional data represents percentages or proportions of a sample from a particular category.

χ^2 -test

A χ^2 -test has three general uses, which are explained below:

1. Goodness of fit
2. Testing for independence
3. Test of homogeneity

The χ^2 -test for goodness of fit is used when determining if the proportions of the samples agree with a specified distribution. The χ^2 -test of independence is used when subjects in a single population are classified according to two different variables. It is used to determine if there is any dependency between the two categorical variables. The χ^2 -test of homogeneity is computed in a similar manner to the χ^2 -test of independence, except that the χ^2 -test of homogeneity is used when there are several populations and one variable. The χ^2 -test for homogeneity is used to determine whether the two populations have similar or homogeneous distributions with respect to some categorical variable.

✦ Two-sample t-test

The statistics necessary for conducting a two-sample t-test include: \bar{x} = the mean of the sample, μ = the population mean, n = the number in the sample, and s = the sample standard deviation (sd).

The test statistic for the t-test is:

$$t = (\bar{x}_1 - \bar{x}_2) / \sqrt{\{(s_1^2 / n_1) + (s_2^2 / n_2)\}}.$$

✦ Pooled t-test

A pooled t-test is very similar to a regular t-test, but it is calculated based on the assumption that the population standard deviations, σ_1 and σ_2 , are equal. This means that the sample standard deviations, s_1 and s_2 , can be combined into one estimation of the joint population standard deviation, σ .

The equation for a pooled t-test is $t = (\bar{x}_1 - \bar{x}_2) / s_p \sqrt{\{(1 / n_1) + (1 / n_2)\}}$, where s_p = the pooled standard deviation. To find the pooled standard deviation, $s_p = \sqrt{\{(n_1 - 1) s_1^2 + (n_2 - 1) s_2^2\} / (n_1 + n_2 - 2)}$.

Statistical studies are important to many fields outside mathematics and statistics. Through analysis of test statistics performed on certain data, one may find trends and probabilities previously not considered in that particular study. Or, one may discover that the original hypothesis is most likely to occur. Many applied mathematicians do not like the ambiguity of the results from test statistics. Because life is uncertain, statistics has many applications.