Achievement Gap Identification

A central focus of Kentucky's school accountability system is on achievement gaps. When using the term "achievement gap," the Kentucky Department of Education (KDE) means the difference in academic achievement between specific groups of students. Achievement gaps are determined through statistical and practical differences. These differences verify that a significant difference (gap) exists.

Practical

An achievement gap is said to have practical significance when the difference in scores is large enough to be considered important. Generally, this means that most educators believe that an intervention to raise up the lower scores is appropriate. Practical significance is a judgement and therefore educators with extensive knowledge and experience are consulted to set cut points in accountability systems.

Statistical

An achievement gap is statistically significant when the mathematical properties of the scores indicate that there is a very small chance that the difference is the results of just the normal random variation in scores. An achievement gap is based on the distribution of scores for two separate groups. Therefore, the department calculates the effect size based on the two group means and the variation within and across the groups.

Significance Level[1 & 2]

A Cohen's *d* is used to determine statistical and practical significance. Cohen's d provides a measure of effect size for comparisons of groups with differing sizes and variability as seen in student groups across the state. This statistical test of significance is used to determine if achievement gaps are significant or not. There are multiple forms of Cohen's d used to determine a significant gap (Glass' Delta, Cohen's d, and Hedges' g). Cohen recommended the effect size and corresponding *d* value shown in Table 1.[2]

Table 1

Effect size	***d***
Small	0.20
Medium	0.50
Large	0.80

In Kentucky's school accountability system, the 1.0 level is used to determine if the achievement gaps are statistically and practically significant. According to Walker[1], "This means that if we see a *d* of 1, we know that the two groups' means differ by one standard deviation; a *d* of .5 tells us that the two groups' means differ by half a standard deviation; and so on."

KDE:OSAA:9/27/2019

Calculation[2 & 3]

The variation of Cohen's d used provides a measure of effect size weighted according to the relative size of each sample. With different sample sizes the variation of Cohen's d called Hedges' g should be used.[3]

$$Hedges'g = {(M_2 - M_1)}/{SD_{pooled}}$$

Where: [2]

$$SD_{pooled} = \sqrt{\frac{(n_1 - 1)s_1^2 + (n_2 - 1)s_2^2}{(n_1 - 1) + (n_2 - 1)}}$$

Next Steps[4]

Identification of achievement gaps is the first step to improving student outcomes. This measure will assist educational leaders to identify the specific achievement gaps that exist in their school. Knowing that gaps are both practically and statistically significant may lead to more informed discussions and action for student groups and individual students. Questions that should be asked include:

1) Which groups are experiencing achievement gaps? 2) Which groups are experiencing gaps in access to key opportunities? 3) Are there gaps in attainment? 4) If so, how can these gaps be addressed? 5) Is it a districtwide issue?

References

[1]Walker, I. (2008). Statistics for Psychology. Retrieved from https://people.bath.ac.uk/pssiw/stats2/page2/page14/page14.html
[2] Heckert, A. (2017) National Institute of Standards and Technology. Hedges G
[3]Stangroom, J. (2019). Social Science Statistics. Retrieved from https://www.socscistatistics.com/effectsize/default3.aspx
[4] National Education Association (2002-2019): http://www.nea.org/home/12464.htm