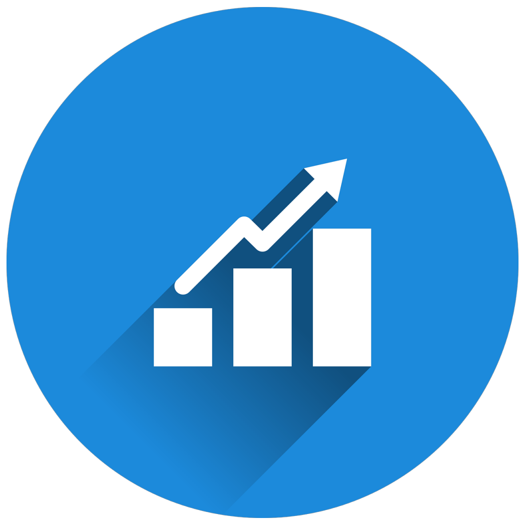
Crack the Code to Student Success!

Get the Hidden Secret for Seismic Jumps in Student Learning



We've all been there before – You're sitting in a staff meeting, professional development day, or at a conference and someone is sharing another "great idea". You're actually intrigued and want to try it out, but that all-to-familiar thought comes creeping into your head: "I just don't have enough time."

Your time is a non-renewable resource. Once it is gone, it can't come back. That's why it is so critical to spend your time on things that give the greatest return on investment. This is true in both your personal and profession life.

In your classroom, you only want to be spending your precious (and limited) time on things that will actually make a difference for your students. Otherwise, you're just wasting your time. If only there was a way to know how big of an impact all these "great ideas" actually have on student learning! Then you could prioritize your efforts on things that matter most.

Oh, wait! There is a way.

The Future of Education
We live in a magnificent time of easy access to research. The field of education is heading down a one-way road toward better evidence-based decisions. There will come

a time, in the very near future, where schools will no longer be able to ignore the robust research that supports strong instructional practices AND the evidence the disavows many ineffective old-school habits. The only question is: how soon will you jump on the evidence train?

One key engineer on this evidence train is EFFECT SIZES. Knowing about effect sizes will allow you to be more effective and waste less time. It is the secret behind most high performing teachers – they do more of what matters most and less of what doesn't matter.

This special report unfolds everything you need to know to maximize your time and efforts as an educator. You'll get answers to all these questions:

- *What is an effect size?*
- *Why is it critical for teachers to be fluent in the language of effect size?*
- *How can educators use effect sizes to make better classroom decisions?*
- *What are the pitfalls with using effect size as the only measure of effectiveness? (And a bonus section for those who want to know how effect sizes are actually calculated)*

It is important to state that effect sizes are not the only, nor the universal best, way to measure effectiveness in education. There is tremendous value in other methods used to evaluate impact on student learning such as formative assessments, student surveys, classroom observations, and student gains in proficiencies vs prior year's success. Each of these hold value, when used in combination with other forms of measurements. The same is true for effect size.

What is an Effect Size?

An effect size (ES) is simply one way to measure the impact a strategy or principle has on student learning. In short, it is a number. This number quantifies the effectiveness of a particular strategy. This number is often calculated by researchers conducting robust studies on specific factors that influence student learning. But you can even calculate your own effect size – how much of an impact YOU are having on student learning. I'll show you how to do that below. It's as simple as a few clicks of your mouse.

For example, the effect size of mnemonics is 0.76; the effect size for students feeling disliked is -0.19 (yes, effect sizes can be negative).

What do those numbers actually mean?

An effect size of 0.4 is equivalent to approximately one years' worth of growth over one academic year. So, anything above a 0.4 will likely be a good investment of your time. Spending hours of your time in an improv class to improve your humor (ES = 0.04) or tens of thousands of dollars to ensure you have one-to-one laptops at your school (ES = 0.16) might be worth a second thought.

Why This Critical Fluency in The Language of Effect Size?

In the past, the majority of decisions in education were made based on intuition, anecdotal experiences, or simply mimicking what they experienced themselves as a student. Educators would try something and say, "It *looked* like students were learning." Or, "I tried it once and it *worked*." This guess-and-check system of education seems a bit risky when you consider education to be the foundation of all individual and societal improvement. Our future is at stake, and luckily, we have access to information that can catapult our decision making far beyond, "that's just what we've always done."

The challenge with the, "I tried it and it worked" mentality is that almost everything "*works*". And by "*works*", I mean almost everything has at least some positive impact on student learning. Compared to the factors that have glaring negative impacts on student achievement (ie. depression, holding students back, and insufficient sleep), the vast majority of strategies and initiatives being used make at least some positive impact.

The big question is, HOW MUCH of an impact? And is that impact worthy of the time, money, and other investments needed? Or would those resources be better spent on using other strategies or initiatives? This is one reason teachers should be fluent in the language of effect sizes – to advocate for the best use of funds AND to focus in on developing the skills, strategies, and mindsets that yield the greatest impact on student learning.

How Can You Use Effect Sizes to Make Better Classroom Decisions?

Here are simple ways you can use the knowledge of effect size to make better classroom decisions:

1. Know the effect size of the strategies, initiatives, and focus areas of your school and individual classroom. Here are some websites to help you in your search:
   - John Hattie's Visible Learning ranked list: https://visible-learning.org/hattie-ranking-influences-effect-sizes-learning-achievement/
     Hattie tends to focus more on **broad factors** relating to learning (ie. Teacher's expectations of student achievement, collective teacher efficacy, parental military deployment, etc.)
   - Robert Marzano's database of research: https://www.marzanoresearch.com/research/database
     Marzano focuses more on **specific strategies** and their impact on student achievement (ie. graphic organizers, cooperative learning, etc.)
   - If you can't find data on a topic you're looking for, you might need to take the exciting plunge into original research articles. A few of my favorite sites to look for quality, peer-reviewed original research are:
     - https://www.ncbi.nlm.nih.gov
     - https://eric.ed.gov
     - https://Scholar.google.com

   Scan the abstract (or article) for a mention of effect size. It will often be labeled as d=0.73, or whatever the value is. Cohen's d is the most commonly used formula for calculating effect size. In fact, it was Jack Cohen (psychologist) who derived the calculation in the 1960s. Hodge's g is another, similar, measure of effect size.

Once you have gathered your data on effect sizes you can bring that information to your team meetings, staff meetings, and your own personal reflections as a teacher. Use the effect size to start meaningful conversations around how planning time, funds, and energy is being used. Acknowledge the efforts made by teachers, the school, and yourself in the past, and then transition to make more impactful decisions in the future.

As mentioned above, you can even calculate YOUR effect size – the impact you are having on your students learning. Be brave to fully reflect on your impact and then start listening to your student's feedback. To start, download this Excel ES calculator at: https://www.visiblelearningplus.com/groups/progress-vs-achievement-tool and follow it's simple format to begin tracking your impact.

What are the Pitfalls with Using ONLY Effect Size Tools?

Be careful to not let effect sizes dictate ALL decisions being made in your classroom and school. Remember, it is *one* way of measuring the effectiveness of something. Use them as a reference to guide discussions and decisions. Engage in meaningful conversations around effect sizes that lead to productive decisions.

For example, a quick scan of Hattie's rankings reveals an effect size of 0.29 for homework. Taken at surface level, a teacher or school might be quick to abolish all homework practices. An informed "consumer" of effect sizes will follow the trail a bit further and see the effect size of homework changes drastically depending on the grade level (hint: the effect size increases dramatically as students age).

Also, a low effect size could be a result of poor use of the principle or strategy. Maybe it is the kind of homework we are giving that is making such a low impact? Maybe my homework practices are inequitable, or require resources not available to your disadvantaged students.

It is also possible that the data is skewed. Many of the effect sizes you hear shouted from the educational rooftops come from meta-analyses (a collection of multiples studies on the same topic rolled into one bigger study). By nature, all of the individual studies were conducted differently, and there are many opportunities for inaccuracies or poor research design such as:

- low sample size (less than 100 participants)
- narrow group of people studied (students in a professor's psych 101 class who were promised a pizza party for participating.)
- one study produced significantly different results, and when combined into a meta-analysis skews the results

Take a closer look into the research before making drastic changes or spending large sums of money.

This article, published on Harvard University's website, offers more valuable insights into the pitfalls of using ES as the only measure of viable factors educators should pursue.

The demands placed on teachers are not getting any lighter, and the list doesn't seem to be getting shorter. Utilizing your time on things that matter MOST is an essential attribute of a balanced, professional, and high-impact teacher.

WHAT NOW? Working with a staff that makes instructional decisions based on what "feels right" is risky business. It is bad for student learning, and can lead to teacher burnout as staff play the guess-and-check game with discouraging odds. If you are struggling to get staff on board with evidence-based instruction, give them the support *THEY NEED*. I share the evidence (and effect size) of every tool I teach (and model). High engagement, high energy with evidence-based tools is my professional development expertise. I'd love to help. Contact me at: < Liesl.mcconchie@gmail.com>

*************************************BONUS************************************

Here's How to Get an Effect Size

You may be curious how effect sizes are calculated. If you are, here is a bonus tutorial on how these powerful indicators are calculated.

How is an Effect Size Calculated?

Understanding how this number is calculated can help you better understand the significance of effect sizes and why they have become one of the most prominent standards for measurement in 21st century education.

You can break down the calculation into three main steps:

STEP 1: Calculate the mean (average) of the experimental group – the group receiving the intervention being measured.

STEP 2: Calculate the mean (average) of the control group – the group NOT receiving the intervention that will act as a comparison point.

STEP 3: Calculate the pooled standard deviation of the two sets of data (experimental and control group).

STEP 4: Use all those values to calculate an effect size.

With those the numbers above, you can calculate an effect size. In words, here is how you calculate an effect size:

Effect Size is a number that tells you the IMPACT you (or an intervention) has on student learning

$$\frac{\text{experimental group (average score)} - \text{control group (average score)}}{\text{variance}}$$

Fritz, C. O., Morris, P. E., & Richler, J. J. (2012). Effect size estimates: current use, calculations, and interpretation. *Journal of experimental psychology: General*, *141*(1), 2.

In the language of mathematics, we would say:

Effect Size = $\frac{\text{[mean of EG]} - \text{[mean of CG]}}{\text{standard deviation}}$

I'll walk you through a simplified calculation of an effect size. Let's pretend the following data is measuring the effectiveness of a particular math program aimed at improving student's math achievement. We'll take one class (with 3 students, for simplicity) that uses the new math program for an allotted time (the experimental group), and another class (as similar to the first class as possible) that does not use the new math program. It is worth pointing out that you would *never* want to trust an effect size calculated on this data set because the sample size (3 students) is too small. But it keeps the calculations simple for our purposes.

Here are the pre-test scores for the two classes, before the "intervention" of using the new math program:

Experimental Group (EG)	Control Group (CG)
3	3
5	4
10	5

Again, here is the linguistic description of what we are calculating:

> Effect Size is a number that tells you the IMPACT you (or an intervention) has on student learning

$$\frac{\text{experimental group (average score)} - \text{control group (average score)}}{\text{variance}}$$

Fritz, C. O., Morris, P. E., & Richler, J. J. (2012). Effect size estimates: current use, calculations, and interpretation. *Journal of experimental psychology: General*, *141*(1), 2.

In math terms, we would say it like this:

$$\frac{\text{[mean of EG]} - \text{[mean of CG]}}{\text{standard deviation}}$$

STEP 1 & 2: Begin by calculating the mean (average) of both groups:

Experimental Group (EG)	Control Group (CG)
3	3
5	4
10	5
18 / 3 = 6	12 / 3 = 4

STEP 3: We now have all the data we need for the numerator (top portion of the formula). To calculate the "variance" we need the pooled standard deviation. This is where things get a bit "mathy".

Pooled Standard deviation

$$\sqrt{\frac{(\text{St. Dev. EG})^2 + (\text{St. Dev. CG})^2}{2}}$$

STEP 3A: To calculate the standard deviation for each set of data (in this case, for each class), we follow this formula:

Standard deviation (for 1 set of data)

$$\sqrt{\frac{\text{Sum of squared differences from mean}}{\text{\# of students}}}$$

Going back to our original set of pre-test scores, we can begin to calculate their standard deviation:

Experimental Group	SQUARED		Control Group	SQUARED	
$3 - 6 = -3$		9	$3 - 4 = -1$		1
$5 - 6 = -1$		1	$4 - 4 = 0$		0
$10 - 6 = 4$		16	$5 - 4 = 1$		1
		26			2

Continuing with the standard deviation formula, we get:

Experimental Group Standard deviation	Control Group Standard deviation
26/3=8.666	2/3=0.666
square root	square root
2.944	0.816

STEP 3B: Now we have all the values needed to calculate the "pooled" standard deviation. As a reminder, here is how you do that:

Pooled Standard deviation

$$\sqrt{\frac{(\text{St. Dev. EG})^2 + (\text{St. Dev. CG})^2}{2}}$$

Plug in all the values, and you get a pooled standard deviation of:

Pooled Standard deviation

2.16

STEP 4: Going back to the original formula to calculate an effect size:

$$\frac{\text{[mean of EG]} - \text{[mean of CG]}}{\text{standard deviation}}$$

We can plug in all the values to discover the effect size of this math program is:

Effect Size

$$\frac{6-4}{2.16} = 0.93$$

IF this study was replicated with a huge sample size (500+ students, a wide range of proficiencies, ethnicities, and grade levels, etc.) and this same resulting effect size were calculated, the math program is producing ***great results***. An effect size of 0.93 is equivalent to nearly 2 years of academic growth within a single academic year!

In essence, the effect size calculation compares the difference between the averages of two groups – one who experimented with a new idea, and one that did not. That difference is then divided by the variance (or spread) of those combined scores. In the end, you get a handy number that puts all research on the same scale so you can see the comparative impact of factors relating to education. Remember, you make a difference, no matter what the effect size is. But with higher effect sizes, you're a far more amazing educator that's changing lives daily.