

QTL

Quality Teaching and Learning:

Cave Creek Education Association: Issue One

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Of Air-Conditioning, Cows, and the F-Hole: A radical reconsideration of grading, and the fallacy of Zero

Welcome

The Cave Creek Education Association welcomes you to the first edition of QTL: Quality Teaching and Learning. The purpose of this quarterly newsletter is to inform you on current trends in teaching and learning, and to provide you with ideas and instruction meant to make your job easier.

And while educational theory and concepts are fun, the overall goal of this newsletter is to give you information that you can use, immediately.

We hope you find this and future newsletters useful.

--Chris Hazeltine, editor.
CCEA Member since 1998.



CCEA

Cave Creek Education Association



My Hero, Zero

"My hero, zero
 Such a funny little hero
 But till you came along
 We counted on our fingers and toes
 Now you're here to stay
 And nobody knows
 How wonderful you are
 Why we could never reach a star
 Without you Zero, my hero
 How wonderful you are."

--My Hero, Zero (Schoolhouse Rock, 1978)

The Zero (0)

At the heart of the following argument is that using zero, as a placeholder, in our grading systems not only creates statistically inaccurate information and erroneous results, it also is detrimental to a student's academic growth.

But first, a brief definition of zero.

Zero is a Placeholder

Developed, discovered, or invented (choose your preference) in the Mesopotamian city-state of Sumer, zero grew "as a symbol of nothingness...on baked clay tablets used for mundane records...zero was used as a place where there was no number (science.howstuffworks.com)

Mathematically, it certainly can be argued that zero is a number. The fine folks at WolframMathWorld contend that zero "is the only integer (and, in fact, the only real number) that is neither negative nor positive" (MathWorld.wolfram.com).

But, the argument here is not a mathematical one; it is one about the fallacy of using a zero as a placeholder in grading and in the grade book. The argument is that zero should never be used as a grade.

The best way to demonstrate this argument is by a little science experiment. Should be very exciting!

$$80 \times 4 / 5 = 64\%?$$

Imagine that you are tasked to measure your air-conditioning to find the average temperature. You will do this for five consecutive days, precisely at 2:00 p.m.

So, on Monday, you check the temperature and it registers 80°. You check on Tuesday and it's 80°. Wednesday. 80°. However, on Thursday, the little battery in your hallway thermostat dies, so it did not register a visible temperature. On Friday, you put a new battery in and, at 2:00 p.m., the temperature was 80°.

Okay, now here comes the tricky part. If you were to average the temperature for all five days, here is the logical thing you would do.

You would multiply 80×4 and then divide by 4. You would do this, logically speaking, because on Thursday, the battery went out and there was no temperature to visibly measure. However, you were able to accurately measure four days out of five. Doing the math, you would come up with an average temperature of 80°, which would be accurate.

Now, let's do the math as if the thermostat was a student and as if Thursday was a missing assignment. As a teacher, you would multiply 80×4 , but then divide by 5, because that's how many days (assignments) you were expecting to measure, whether you visibly could see something to measure or not. There was no temperature (assignment) on Thursday, so as a teacher, you put in a zero, which is traditional.

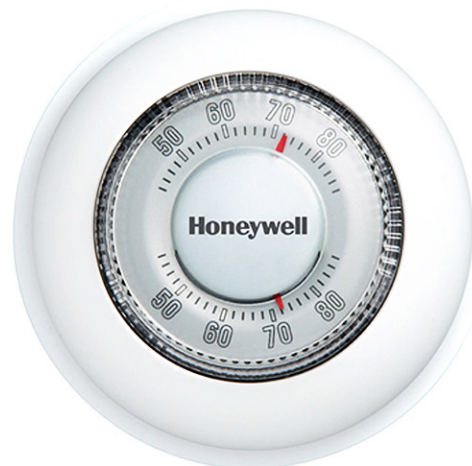
In that case, doing the math looks like this:
 $80 \times 4 / 5 = 64^\circ$ (64%).

Logic says your house did not hold as average temperature of 64°. It was 80°.

What we see with this little math problem is how a zero, used as a placeholder, artificially skews the average.

Remember, the argument here is about using a zero as a placeholder. A thousand years ago, when teachers used to keep and calculate grade books by hand, it was common practice to drop missing assignments when calculating a student's over-all grade for the semester or year. It was as if a teacher intuitively knew that entering a zero would not accurately reflect a student's grade. And, it never really worked out on a calculator, anyway. And, yes, we used to calculate grades for only the semester, never every 30-minutes like we do, today.

Now that we're in the 21st Century and grade books are computer programs, the argument for the fallacy of a zero as a placeholder is even stronger. As teachers, we don't calculate grades anymore. It's automatic. However, the use of a zero as a placeholder is a traditional holdover, but it's one that causes the same inaccuracy in a student's grade average.





“This is not--contrary to popular mythology—“giving” students 50 points; rather, it is awarding a punishment that fits the crime. The students failed to turn in an assignment, so they receive a failing grade. They are not sent to a Siberian labor camp. There is, of course, an important difference. Sentences at Siberian labor camps ultimately come to an end, while grades of zero on a 100-point scale last forever. Just two or three zeros are sufficient to cause failure for an entire semester, and just a few course failures can lead a student to drop out of high school, incurring a lifetime of personal and social consequences.” --- Douglas B. Reeves, Phi Delta Kappan

Criteria for Assessment

Percentage of animals stunned, or killed, correctly on the first attempt (this has to be at least 95 percent of the animals).

Percentage of animals that remain unconscious after stunning (*this must be 100 percent*).

Percentage of animals that vocalize (squeal, bellow, or moo, meaning “ouch!” or “you’re scaring me!”) during handling and stunning (no more than 3 cattle out of 100).

Percentage of animals that fall down (animals are terrified of falling down, and this should be no more than 1 out of 100).

Electric prod usage (no more than 25 percent of the animals).

So, what is the tradition? How is it that a zero was ever used as a placeholder?

Radical argument #2: Killing the sacred cow of the 100-point scale

First, a story. Dr. Temple Grandin, professor of Animal Science at Colorado State University, author, and speaker on the subject of Autism, initially began her career as a livestock-handling equipment designer and inspector of slaughterhouses. As she describes in her book, *Animals in Translation*, prior to her work as a meat-packing (slaughterhouse) inspector, when a meat-packing plant was inspected, it was assessed using a 100-point scale. From her experience, it was conceivable that a slaughterhouse could fail 50 points on the inspection and yet still pass the inspection. This is because the traditional 100-point scale measured methods used rather than standards. A slaughterhouse could pass inspection based on methods; yet cows suffered. In other words, “The surgery was a success, but the patient died.”

As an inspector of slaughterhouses, Dr. Grandin revised the assessment model to more accurately reflect *standards* rather than *methods*. Her *Hazard Analysis Critical Control Point* analysis (HACCP) was designed not only to be simple and less cumbersome than the traditional 100-point method, it was designed to measure outcomes; namely, how is the cow fairing? Her criteria for assessment can be seen to the left.

“A Good assessment has to measure the Student, not the assignment.”

Her logic for the revision being, if there is anything that affects these criteria (how cows feel), then you fail the evaluation. As Dr. Grandin contends, “A good animal welfare audit has to measure the animal, not the plant.” To put it another way, a good assessment has to measure the student, not the assignment.

So, how does this compare to the traditional 100-point scale we teachers all know and love? It's simple. Like the old, slaughterhouse scale, a student's academic success is diluted by too many variables. With a simple scale, say a 4, 5, or 6-point scale, we all can argue or discuss the difference between an 80% and a 90%.

It's very hard, empirically speaking, to argue what is the difference between an 85% and an 87%.

We can clearly see the difference between 80% and 90%. With 85%-87%...not so much.

What's worse, the traditional 100-point scale leads to the dreaded “F-Hole,” and when it comes to assessing students, this is the most unfair.



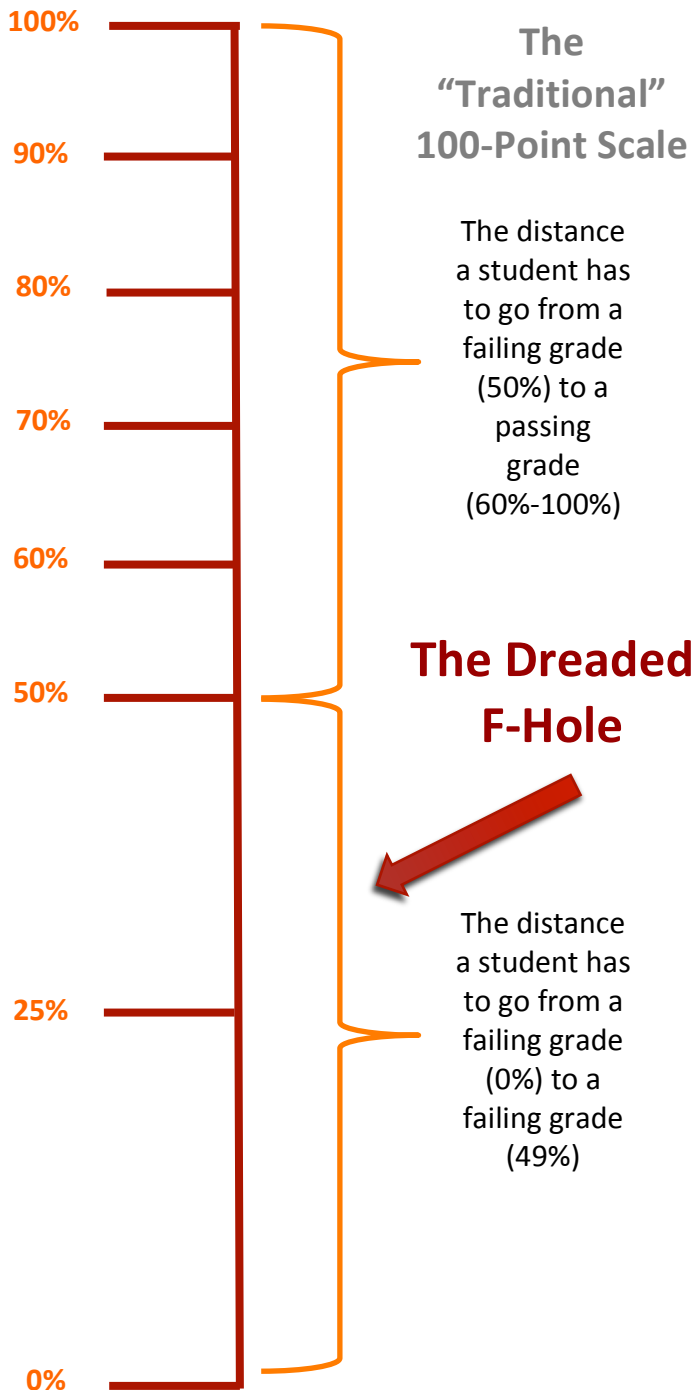
Dr. Temple Grandin

Photo Credit: Rural (abc.net.au)

"Just because something is mathematically easy to calculate doesn't mean it's pedagogically sound. The 100-point scale makes averaging attractive to teachers, and averaging implies credible, mathematical objectivity. However, statistics can be manipulated and manipulative in a variety of ways." --- Rick Wormeli

The F-Hole

Usually, when students hear about the F-Hole, they tend to add a few more letters to it. But, what is it? It's easier to show than tell:



The big, massive assumption during this whole article is this: what we want for our students is academic success, and what we want to measure is achievement and growth.

That said, the crux of the argument is that when we use zeros in our grading, and when we use a traditional 100-point scale as a measuring tool, we unintentionally doom our students.

As we have seen from the air-conditioning experiment, using zeros skews the grade-point average and is not an accurate reflection of what is being measured.

And, as we have seen from Dr. Grandin's work, what we are truly measuring, in our students, is outcome of academic growth, not the system by which they got there.

If we continue to "grade the way we were graded," we do a disservice to our students.

A Radical Alternative

Take another look at the "F-Hole" and notice, first, how far a student has to go from failing (50%) to passing (60%-100%). Now, look how far a student has to go from failing (0%) to failing (49%).

It has been argued that using zeros in grading and using a 100-point scale is an inaccurate method of measuring student achievement because, as we have seen, zeros artificially shoot the grade lower and, with a 100-point scale, there are too many variables.

Ask yourself:

How much does a student need to fail, to fail?

“How much does a student need to fail, to fail?”

Shouldn't a student have the opportunity to pull themselves out of a failing grade? Or should they wallow forever in the “F-Hole” without any recourse to pull themselves out. How would you feel if you were put in the same position?

Grading policies and methods are, for a teacher, one of the most personal and proprietary tools in our professional lives.

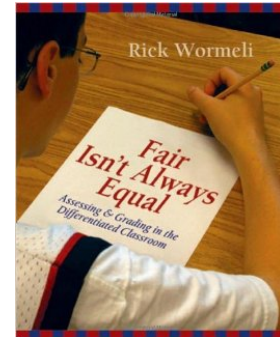
“You can take my land, but you can't take my grading policy!”

At the same time, consider if you are inadvertently throwing your students into the “F-Hole” of academic achievement.

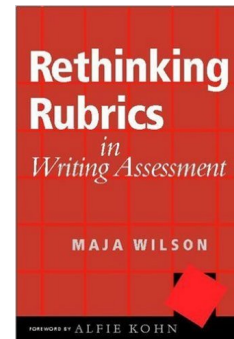
What would happen, really, if you reduced your grading scale from 0% - 100% to 50% - 100%? 50% is still failing; yet with this scale, a student has to opportunity to improve. And it gets rid of the zero (the little bugger). But wait?!? What if a student does not turn in an assignment? Simple, they get a 50%. Again, how much failing does a student need?

Also, if you don't already, consider using rubrics to back-up your grading system. Remember that a rubric is not a checklist. It is a narrative that clearly shows what that grade means: what an “A” looks like, what a “B” looks like, etc.

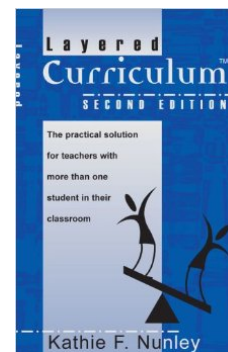
To the right are three excellent books you should read that address this argument of using zero much more in-depth. They also provide alternative methods of grading that are excellent and authentic.



Fair Isn't Always Equal: Assessing & Grading in the Differentiated Classroom, by Rick Wormeli (2006) Stenhouse (ISBN 1-57110-424-0)



Rethinking Rubrics in Writing Assessment, by Maja Wilson (2006) Heinemann, (ISBN 0-325-00856-6)



Layered Curriculum, by Kathie F. Nunley (2002) Help4Teachers.com (ISBN 1-929358-08-3)

A pastoral scene featuring a lush green field with several cows grazing. The cows are of various breeds, including black and white Holsteins and a brown cow. The field is expansive, with a line of trees in the distance under a bright blue sky filled with large, white, fluffy clouds. Two birds are visible in flight in the middle ground.

Until Next Time...

Teach Well