“Why Am I Grading This?”

Mindsets & Mastery in the Science Classroom
Things I Have to Do When I Grade

- Grade
- Complain about Grading
Table Talk: What Are The Biggest Grading Challenges You Face?

YOU SEE...THE EVIDENCE OF LEARNING LINES UP PERFECTLY WITH THE PROFICIENCY SCALE.

I LIKE GRADING LATE PAPERS!

GRADING LATE PAPERS IS MY FAVORITE!
TPS: Important Questions

What IS a Grade?  

“What IS a Grade? What SHOULD A Grade Be?”

“Do you grade on a curve?”
TPS - THE TWO BIG QUESTIONS

WHAT IS A GRADE?

• A measure of what a student learned or did/didn’t do
• An index of student attendance
• An incentive/punishment
• An index of student behavior
• A mathematically calculated average of all the points students earned in a period of time
• A number/letter assigned in order to make decisions about students

WHAT SHOULD IT BE?

• SB 2033 81st Legislature (Current Law)
• “A district grading policy…must require a classroom teacher to assign a grade that reflects the student’s relative mastery of an assignment…”
• “…may allow a student a reasonable opportunity to make up or redo a class assignment or examination for which the student received a failing grade.”
• Do our gradebooks reflect this? Do we WANT them to?
THE PITFALLS OF TRADITIONAL GRADING

1. There is too much of it
   • need enough of them to “get a good average”

2. Calculating a % grade for everything
   • what if there are 7 parts to the assignment? 13 questions? How much is a drawing/essay worth compared to a MC response?

3. It’s practice
   • why should I be grading it if they haven’t mastered it yet?

4. Copying & “Group work”
   • how do I know if they really learned anything for themselves?

5. Constant access to technology and “the answers”
   • did they know it, or did they just find it?
6. Student/parent demands for “extra credit” at the end of every six weeks
   • we can’t have TOO many failures, right?

7. What is the point of the work we give them?
   • Did we give them the work because we “needed a grade”?
   • What objectives do our worksheets truly address?

8. ZEROS!
   • does the fact that they didn’t do the written assignment mean that they didn’t learn anything?

9. Late Work
   • how much should a student be penalized?

10. Dropping the lowest grade
    • Why? Why not? What is an “average” meant to show?
WHAT IS THE BIGGEST ASSUMPTION WE MAKE WHEN PUBLISHING STUDENT GRADES?
10,000 Teachers Can’t Be Wrong, Right??

Grades for the SAME Student

C, C, MA (Missing Assignment), D, C, B, MA, MA, B, A

Adapted from D. Reeves (2009)
Why Do We Even Use Numbers for Grades?

- A = Excellent – equivalent to percents 95-100
- B = Good, equivalent to percents 85-94 (inclusive)
- C = Fair – equivalent to percents 76-84 (inclusive)
- D = Passed (barely) – equivalent to percent 75
- E = Failed (below 75)
  - 1897 Mount Holyoke College, Massachusetts
  - Earliest “numerical gradebook” recorded
- William Parish 1792 – proposed the “industrial model” of education
  - Focus on comparison, replicability and “quality control”
- **How did we measure & report student learning BEFORE this?!**
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**Grading standards:**

- 90% – 100% = A
- 80% – 89% = B
- 70% – 79% = C
- 60% – 69% = D
- 59% = F

**Why is “passing” in Texas a 70?**

**Questions:** Which grading method is best? Which is fairest? What grade does each student deserve?
Can Anyone See The Problem?

Mathematical averages do NOT tell the whole story of learning!

The problem with traditional grading

Comic from xkcd: http://xkcd.com/937/
The Mean Can Be Mean!

- What’s the average (mean) temperature?
- What if we forgot to record the temperature on Friday?
  - If we counted Friday’s missing data as a zero, what is the new mean?
  - What if we ignored Friday, and just divided by 4 for the mean?
  - Which average is more accurate, instructive and useful?!
“If we grade EVERYTHING on a 0-100 scale, (and only >70 counts for credit) the scales are already tilted towards failure”
“School is the only place where it matters that I didn’t know something before I know it now…”

- Previous failures are viewed as “permanent tattoos”, rather than pencil marks that can be erased
- Students who took longer to demonstrate mastery earn lower grades than those who show it quickly
- Think about the motivational implications of this…
Fixed Mindset
Carol Dweck

Intelligence is static.
Leads to a desire to LOOK SMART and therefore a tendency to:

- AVOID CHALLENGES
- GIVE UP EASILY DUE TO OBSTACLES
- SEE EFFORT AS FRUITLESS
- IGNORE USEFUL FEEDBACK
- BE THREATENED BY OTHERS’ SUCCESS

Growth Mindset

Intelligence can be developed
Leads to a desire to LEARN and therefore a tendency to:

- EMBRACE CHALLENGES
- PERSIST DESPITE OBSTACLES
- SEE EFFORT AS PATH TO MASTERY
- LEARN FROM CRITICISM
- BE INSPIRED BY OTHERS’ SUCCESS
WHAT HAPPENED TO YOU?
HOBBS AND I HAD A FRANK EXCHANGE OF IDEAS.

WHAT ARE YOU DOING? HOMEWORK??

I WASN'T SURE I UNDERSTOOD THIS CHAPTER, SO I REVIEWED MY NOTES FROM THE LAST CHAPTER AND NOW I'M REREADING THIS.

YOU DO ALL THAT WORK?!

WELL, NOW I UNDERSTAND IT.

HUH! I USED TO THINK YOU WERE SMART.
“When teachers combine initial low scores with newly earned higher scores, the result is usually somewhere in the middle. This means that students must outperform themselves significantly to have any impact on their final grades. Nothing is more frustrating to a struggling student than finally scoring well on a significant assignment, only to have their overall level of proficiency increase by a miniscule amount…”

(Schimmer 2016)
ABSENCES...

“Applying a behavioral penalty (ex DMC) to an academic misstep (ex failing a test) makes NO SENSE, so why do we routinely do it in reverse?!“
“Students don’t understand less about a topic because they hand their teacher something a few days after it was due, but if we lower the students’ scores, that’s exactly what we communicate...”

(Schimmer 2016)
In the “real world”, timelines are frequently renegotiated or adjusted to circumstances & deadlines range from fixed to flexible...we prepare students better for the real world when we offer a variety of deadlines”

(Ken O’Connor)
So what do we do about this?

- **Option 1: Go “all-in”**
  - Adopt a Mastery Learning/Standards-Based Grading system
  - Systematic redesign of instruction and assessment

- **Option 2: Take a trial lap**
  - Modification of major assessments
  - Modification of philosophy (zeros, deadlines and reassessment)

- **Option 3: Dip my toes in**
  - Modification of philosophy (zeros, deadlines and reassessment)
**Going All-In: STEP 1**

- **Re-write your TEKS as scaled performance objectives (Bloom’s)**
  - Use Bloom’s to create performance objectives/TSW standards that are scaled according to the “level of mastery”
  - 1 = Below Minimum Standard (ex. STAAR “Did not meet grade level”)
  - 2 = Minimum Standard (ex. STAAR “Approaches”)
  - 3 = Mastery Standard (ex. STAAR “Meets”)
  - 4 = Beyond Mastery Standard (ex. STAAR “Masters”)
  - Scaled performance verbs identified for each sub-objective
  - Ex. “Mastery Learning Document” for Biology
<table>
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<th>Major Concept</th>
<th>Beginner</th>
<th>Partially Proficient</th>
<th>Proficient</th>
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<td><strong>Prokaryotic Reproduction and Growth</strong></td>
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<td>4B, 5A, 6A, 9C</td>
<td><strong>List</strong> the characteristics of prokaryotic cells including lack nucleus and membrane-bound organelles (PROK1)</td>
<td><strong>Investigate</strong> limits to prokaryotic cell size using a model such as agar or potato cubes (2F, 2G)</td>
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<td>(5-7 days)</td>
<td><strong>Know</strong> there are limits to the size of prokaryotic cells</td>
<td><strong>Propose</strong> what would happen to a prokaryotic cell if enough materials cannot get in or out</td>
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<td><strong>Know</strong> prokaryotes reproduce quickly</td>
<td><strong>Observe</strong> and <strong>describe</strong> prokaryotic population growth by growing non-pathogenic cultures obtained from SRC (2F)</td>
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<td><strong>Define</strong> generation as a single step in the passage of genes from parent to offspring (7.14A)</td>
<td><strong>Compare</strong> observations of prokaryotic characteristics such as cell size as seen under the microscope to non-pathogenic bacteria cultures</td>
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<td><strong>Define</strong> daughter cell as cells resulting from the division of a single cell</td>
<td><strong>Observe</strong> and <strong>describe</strong> prokaryotes using prepared slides and microscopes</td>
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<td><strong>Know</strong> that daughter cell does not signify gender</td>
<td><strong>Model</strong> and <strong>describe</strong> the process of binary fission</td>
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<td><strong>Define</strong> parent cell as the cell that divides and thus usually results in two identical daughter cells</td>
<td><strong>Know</strong> the difference between cell enlargement and cell division (binary fission)</td>
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<td><strong>Define</strong> binary fission as the asexual reproductive process used by prokaryotes and results in the reproduction of a living cell by division into two equal, or near equal, parts</td>
<td><strong>Explain</strong> the benefits of asexual reproduction</td>
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| **Prokaryotic Reproduction and Growth (cont.)** | • Know DNA carries inheritance information for traits in prokaryotes such as shape, colonization patterns, color, type of cell wall, and energy acquisition/ use (NOL PROK1)  
• Know elemental composition of DNA (MS, NOL) (Spring EOC 2013 Q36)  
• Describe the DNA molecule, including nucleotide (sugar, phosphate, base), base-pairing, and double helix shape (NOL) (Spring EOC 2013 Q30: 2014 Q52)  
• Know sequence of bases in DNA provides instructions for the traits of an organism  
• Define DNA replication as the process by which the two strands of an existing DNA molecule are used as templates for the synthesis of complementary DNA strands and usually results in an identical DNA molecule.  
• Observe DNA replication animation  
• Define enzymes as protein that acts as biological | • Identify organisms that have the same DNA vs different DNA when provided examples of various prokaryotic populations or organisms  
• Know nucleotides are joined by weak hydrogen bonds that are broken during DNA replication (Spring EOC 2013 Q18)  
• Model and describe DNA replication using simulations, manipulatives, etc.  
• Compare the DNA sequence before replication to the sequence after replication  
• Model and observe using animations, simulations and/or manipulatives showing how enzymes facilitate breaking of hydrogen bonds and the synthesis of new DNA strands  
• Explain why cells must divide  
• State why DNA replication occurs before binary fission  
• Know the cell cycle is a model describing cell | • Connect the structure of DNA to its function as the molecule of inheritance  
• Diagram DNA replication  
• Explain how enzymes facilitate DNA replication in a cell  
• Evaluate the limits of a model showing how enzymes facilitate breaking of hydrogen bonds and the synthesis of new DNA strands (3F)  
• Analyze the significance of DNA replication in prokaryote growth and reproduction to prokaryotic population growth cultures (2F)  
• Apply processes involved in prokaryotic life cycle including growth, DNA replication, and binary fission to cell cycle model (i.e. G1, S, G2, and division)  
• Explain the difference between cell growth and population (culture) growth. | • Explain what would happen in the absence of an enzyme in a series of reactions or events when given a diagram or description (Spring EOC 2014 Q30) |
Step 2: UNIT RUBRICS

• Start each unit knowing EXACTLY what student mastery will look like at the end of it
• Students have to know this – *What am I aiming for? How will I earn an “A” on this unit? How will I show I have learned this?*
• Rubric documents are published to students and parents BEFORE instruction begins
• Refer to them constantly during instruction
• Use them as a guideline for “re-assessment” later

Step 3: TARGETED PRACTICE

• All student “practice” activities are *targeted* to a specific objective on the rubric
  – MANY of our old worksheets will no longer work for this
• Work must be quickly evaluated and constructive *feedback* given
• No “grade” needs to be published, as long as there is useful feedback to the students
  – Encourages risk-taking and a “growth mindset”
## Biology: UNIT 5 Prokaryotic Life II STANDARDS
### Test: Wed, Dec 10

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<tr>
<td><strong>5A: Prokaryotic growth, relationships &amp; reproduction</strong></td>
<td>I Can: - recall prokaryotic characteristics - identify prokaryotic roles and relationships in ecosystems &amp; organisms - recall the roles of bacteria in the carbon and nitrogen cycle - define methods of bacterial reproduction (binary fission, conjugation, spore formation, transformation)</td>
<td>I Can: - explain the roles of bacteria in the carbon and nitrogen cycle - explain the beneficial and harmful roles of prokaryotes in individuals and ecosystems - describe the use of bacteria in industrial and technological applications - identify methods of bacterial reproduction - explain the benefits of asexual reproduction</td>
<td>I Can: - predict the effects of removal or addition of prokaryotic organisms in biological systems - evaluate the role of antibiotics in controlling prokaryotic reproduction</td>
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<tr>
<td><strong>5B: DNA structure, function &amp; replication</strong></td>
<td>I Can: - identify the location of DNA in prokaryotic cells - define the function of DNA - define DNA replication - identify the subunit of DNA - identify components of a nucleotide - know the role of enzymes in DNA replication - define DNA mutation</td>
<td>I Can: - pair DNA nucleotide bases correctly - correctly label the structure of a DNA molecule - describe hydrogen bonding in a DNA molecule - summarize and diagram the steps of DNA replication - know there are enzymes that help facilitate DNA replication - explain how enzymes facilitate DNA replication in a cell</td>
<td>I Can: - analyze the significance of mutation to an organism - explain the significance of mutations in DNA replication - connect the structure of DNA to its function of carrying information for future prokaryotes - apply Chargaff's base pair rule</td>
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**Key Terms/Concepts:** Binary fission, conjugation, spore formation, transformation, DNA replication, DNA base pair rule, hydrogen bonding in DNA, mutation, antibiotic.
STEP 4: FEEDBACK is more important than grades!

- Kids can learn without grades
- Teachers can teach without grades
- Feedback IS essential:
  - Underlining errors
  - Verbal coaching
  - Write their current “level” of mastery on the assignment (I, II, III or IV)
  - Use a checklist?
  - Have THEM grade themselves, using the rubric?
STEP 5: REPORT GRADES DIFFERENTLY!

**SUB-DIVIDED TESTS**

- Tests are structured the same way as the rubric
- One test may produce 2-3 separate “grades”
- A published grade shows the degree of mastery achieved for each sub-objective
  - Test grades are now diagnostic and mean something to students/parents/teachers!
  - No more “extra credit” requests!

**UNUSUAL GRADEBOOK**

- Only 10-12 “grades” per grading period
- One column for each objective
- Other gradebook categories might include:
  - Quizzes (continued mastery – do you still know the last unit’s material?)
  - Work Skills (use the CCR standards & process skill TEKS)
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<td>87.00</td>
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</tbody>
</table>
Step 6: Reassess Learning

- More than just a “re-do” for extra points
- More than just “test corrections” for extra points
- Use the rubric to create reassessments for any “un-mastered” material
- If students have mastered it now, why should it matter that they did back then?
- Why not award the grade for mastery they have earned?
EVERYTHING I KNOW ABOUT THIS TOPIC BUT WASN'T ASKED ON THE TEST

What is light - energy that we can see
Luminous - things that give off light
Examples - candles, light bulbs, sun, fire, etc.
Non-luminous examples - moon, people, butterflies, etc.

Crest
Trough

All energy travels in waves.

Energy cannot be created or destroyed.

Ultra-violet
- used to find jaundice in babies.

Transmit
Absorb
Reflect

Incongdenesc - heat and light
Fluorescent - electrical - ultraviolet
Phosphorescent - visible - ultraviolet light

Chemiluminescent - chemical reaction to visible light

Light is drawn with straight lines with arrows.
but does it work
The graph depicts 2015 EOC Data for different racial and educational categories across subjects. The categories include Eco. Dis., African American, Hispanic, White, SPED, and ELL. The subjects are ELA, Math, Science, and Social Studies. The graph shows the performance trends for each category in these subjects.
CAUTIONARY TALES: PART 1

• What if they won’t do the practice assignments?
  – Use a “work-skills” rubric, (use the CCRS?), and take points off this category as students fail to meet your expectations
  – Since the assignments are targeted practice for the Test, help students understand why they matter!

• What if they routinely turn in work late?
  – Still provide feedback on the assignment (they still need it)
  – Remove points from their “work-skills” category

• What if they BOMB the unit test, but you think they really HAVE mastered the material?
  – Verbal conference re: specific test questions?
  – Have students perform the rubric item that they failed to master via “reassessment”
  – Have your re-assessments written in advance, based on the unit rubric
CAUTIONARY TALES: PART 2

• What if my school district has specific gradebook requirements?
  – Work within it. Call your grades whatever you need to call them in order to satisfy district requirements
  – As long as it is measurable for mastery, you can put it in the gradebook

• What if my district has a specific re-do/re-test policy??
  – CFISD: re-do or re-test ________________ for a max. grade of 70%.....
    • QUESTION: Is doing the same thing again for a lower maximum grade really rewarding mastery, or fostering a Growth Mindset?
  – What about re-ASSESSMENT? Look at the “extra credit” clause in your grading policy:
    • “Extra credit or additional points should correspond with a higher or increased level of mastery, and not simply additional work”
CAUTIONARY TALES: PART 3

• What if I/we don’t have time to write rubrics and MLDs?

• Take a “practice lap” or just “dip your toes” in:
  – Split up your tests into separate objective grades
  – Re-think late work and zeros
  – Follow a mastery paradigm when selecting student activities
    • Choose activities that are targeted to a specific objective, and allow for students to practice and take risks without a gradebook penalty
    • Only put the mastery activities in the gradebook
  – Plan to REASSESS, providing opportunities for students to show higher mastery later on
Mastery Learning is also known as:

“Competency-Based Education”


“This approach to learning & grading is considered a Level 5 indicator [the highest] of a high reliability school” – Robert Marzano
• Rethinking Grading: Meaningful Assessment for Standards-based Learning
  – Vatterott 2015
  – Debunks arguments against SBG
  – Provides concrete examples of how to implement master/standards-based grading at the Elementary, Middle and High School level
• Grading from the Inside Out
  – Tom Shimmer 2016
  – An elegant argument for a different grading mindset
  – Describes the pitfalls of traditional grading
  – Very open-ended
  – All grade levels
  – MY FAVORITE BOOK on grading!
Beyond the Grade: Refining Practices that Boost Student Achievement

- Canady, Canady & Meek 2017
- Identifies how traditional grading practices can widen the learning gaps in students with disabilities & minority populations
- Practical steps for changing how we grade things
- All grade levels
• A School Leader's Guide to Standards-Based Grading
  – Marzano Research Lab Pubs.
  – by Tammy Heflebower (Author), Jan K. Hoegh (Author), Phil Warrick (Author), With Mitzi Hoback (Author), & 3 more (2014)
  – Recommends a 4 yr implementation plan
  – Case studies of teacher teams that have implemented SBG in different ways
• Developing Standards Based Report Cards
  – Guskey & Bailey 2010
  – Tips and strategies for how to communicate progress and mastery to students, parents and administrators
  – Focused on the gradebook
  – All grade levels
• Mastery Learning in the Science Classroom: Success for Every Student
  – Kelly Morgan, NSTA Press, 2011
  – Tips and strategies for implementing a mastery approach in science
  – All grade levels
Professor Zapinsky proved that the squid is more intelligent than the housecat when posed with puzzles under similar conditions.