ANALYZING ASSESSMENTS

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• Today’s Outcomes:
  • Identify resources for determining the depth and rigor of standards.
  • Analyze questions to determine alignment with standards.
  • Analyze & provide strategies for feedback given to students.
• **Success Criteria**

  • Able to use the appropriate Rigor Matrix to determine difficulty versus complexity of assessment items.
  
  • Able to use the Analyzing Assessments and Assignments to critique assessments.
  
  • Able to infuse feedback, feed-forward, and academic language in assessment review.
• But the true test of an equitable education is whether students—regardless of their race, income, or where they live—are well prepared for life, college, and career. If we want opportunity for all students, our teaching has to be equitable, too—even in math.—Achievement Network
Think, Write, Pair, Share

- What percentage of assignments are aligned to grade appropriate standards?
- What percentage of assignments require students to only recall or apply basic skills or concepts?
- Why?
The Need?

- 1800 middle school assignments studied by Education Trust
- According to study of middle grades study a little over 2/3 aligned or partially aligned to grade level standards.
- About 90% of assignments were recalling a fact, performing a simple procedure, or applying basic knowledge to a skill or concept.
- Assignments were more than twice as likely to focus on procedural skills and fluency (87 percent) compared with conceptual understanding (38 percent) or application of a mathematical concept (39 percent).
- Only 36 percent required students to write anything besides an answer, and 95 percent of assignments showed no opportunity for discussion.

An assessment literate individual is one who understands how student assessment can enable them to better carry out their role in education, believes that assessment can improve teaching and learning, and puts into place activities and behaviors reflecting these beliefs (MAC, 2015).

www.michiganassessmentconsortium.org/als/standards-for-teachers
WHAT DOES GOOD ASSESSMENT LOOK LIKE?

• It mirrors good instruction!

• Just like instructional materials, assessment materials include
  • Questions that are worth asking and require that students
    • read closely
    • think deeply, analyzing important mathematical ideas
    • use evidence/proofs to support their answers
Reverse effects
Developmental effects
Teacher effects

Zone of desired effects

Teacher Efficacy: $d = 1.57$

Analyzing Assessments and Assignments

Teacher: ___________________ Grade_______ Subject__________________

1. Do the questions align with the stated standards? Yes/No  If not, which standards are being assessed?

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

2. How many of the items focus on the Major Work of the Grade? Out of how many?

________________________________________________________________________

3. What mathematical vocabulary are included?

________________________________________________________________________
Feedback: providing students with information about their success and needs

Feed forward: using student performance for “next steps” instruction and feeding this into an instructional model
Purpose:

- For students to get feedback while they are still mindful of the learning target
- For students to get feedback while there is still time for them to act on it

Examples of Good Feedback

- Returning a test or assignment the next day
- Giving immediate oral responses to questions of fact
- Giving immediate oral responses to student misconceptions

Examples of Bad Feedback

- Returning a test or assignment two weeks after it is completed
- Ignoring errors or misconceptions (thereby implying acceptance)
- Going over a test or assignment when the unit is over and there is no opportunity to show improvement
Purpose:

- For students to get enough feedback so that they understand what to do but not so much that the work has been done for them (differs case by case)
- For students to get feedback on "teachable moment" points but not an overwhelming number

**Examples of Good Feedback**

- Selecting two or three main points about a paper for comment
- Giving feedback on important learning targets
- Commenting on at least as many strengths as weaknesses

**Examples of Bad Feedback**

- Returning a student's paper with every error in mechanics edited
- Writing comments on a paper that are more voluminous than the paper itself
- Writing voluminous comments on poor-quality papers and almost nothing on good-quality papers
- Checks for wrong answers with no explanation.
- Stickers, smiley faces, and atta-boys.
Feedback is not enough
Feed forward

Where to next?
In groups of 3-4:

- Read through the assessment
- Look at the feedback teachers have provided to students on the assessments (question 8). What feedback and feed-forward would you give the teachers?
THE STANDARDS REQUIRE A BALANCE OF:

- Conceptual understanding: Students must be able to access concepts from a number of perspectives so that they are able to see math as more than a set of mnemonics or discrete procedures.

- Procedural skill and fluency: Students are given opportunities to practice core functions such as single-digit multiplication so that they have access to more complex concepts and procedures.

- Application: Students use math flexibly for applications in problem-solving contexts. In content areas outside of math, particularly science, students are given the opportunity to use math to make meaning of and access content.
This document shows where students and teachers should spend the large majority of their time in order to meet the expectations of the Standards.

Not all content in a given grade is emphasized equally in the Standards. Some clusters require greater emphasis than others based on the depth of the ideas, the time that they take to master, and/or their importance to future mathematics or the demands of college and career readiness. More time in these areas is also necessary for students to meet the Standards for Mathematical Practice.

To say that some things have greater emphasis is not to say that anything in the Standards can safely be neglected in instruction. Neglecting material will leave gaps in student skill and understanding and may leave students unprepared for the challenges of a later grade.

Students should spend the large majority\(^1\) of their time on the major work of the grade (\(\square\)). Supporting work (\(\square\)) and, where appropriate, additional work (\(\bigcirc\)) can engage students in the major work of the grade.\(^2,3\)

### MAJOR, SUPPORTING, AND ADDITIONAL CLUSTERS FOR GRADE 4

Emphases are given at the cluster level. Refer to the Common Core State Standards for Mathematics for the specific standards that fall within each cluster.

**Key:**
- ■ Major Clusters
- ○ Supporting Clusters
- □ Additional Clusters

<table>
<thead>
<tr>
<th>4.OA.A</th>
<th>Use the four operations with whole numbers to solve problems.</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.OA.B</td>
<td>Gain familiarity with factors and multiples.</td>
</tr>
<tr>
<td>4.OA.C</td>
<td>Generate and analyze patterns.</td>
</tr>
<tr>
<td>4.NBT.A</td>
<td>Generalize place value understanding for multi-digit whole numbers.</td>
</tr>
<tr>
<td>4.NBT.B</td>
<td>Use place value understanding and properties of operations to perform multi-digit arithmetic.</td>
</tr>
<tr>
<td>4.NF.A</td>
<td>Extend understanding of fraction equivalence and ordering.</td>
</tr>
<tr>
<td>4.NF.B</td>
<td>Build fractions from unit fractions by applying and extending previous understandings of operations on whole numbers.</td>
</tr>
<tr>
<td>4.NF.C</td>
<td>Understand decimal notation for fractions, and compare decimal fractions.</td>
</tr>
<tr>
<td>4.MD.A</td>
<td>Solve problems involving measurement and conversion of measurements from a larger unit to a smaller unit.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>HIGHLIGHTS OF MAJOR WORK IN GRADES K–8</th>
</tr>
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<tbody>
<tr>
<td>K–2</td>
</tr>
<tr>
<td>3–5</td>
</tr>
<tr>
<td>6</td>
</tr>
<tr>
<td>7</td>
</tr>
<tr>
<td>8</td>
</tr>
</tbody>
</table>

### REQUIRED FLUENCIES FOR GRADE 4

- Fluency in adding and subtracting multi-digit numbers using the standard algorithm, and in multiplying and dividing multi-digit whole numbers using the standard algorithm.
In groups of four or five:

- With your group answer questions 1, 2, and 4 on the Analyzing Assessments and Assignments Handout. Be sure to give specific and actionable feedback.
# DIFFICULTY V. COMPLEXITY

<table>
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<th>DIFFICULTY</th>
<th>COMPLEXITY</th>
</tr>
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<tr>
<td>• A measure of <strong>effort</strong> required to complete a task.</td>
<td>• A measure of the <strong>thinking, action, or knowledge</strong> that is needed to complete the task.</td>
</tr>
<tr>
<td>• In assessment, a function of how many people can complete the task correctly.</td>
<td>• In assessment, how many different ways can the task be accomplished.</td>
</tr>
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## Hess Cognitive Rigor Matrix (Math-Science CRM):
Applying Webb’s Depth-of-Knowledge Levels to Bloom’s Cognitive Process Dimensions

<table>
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<tr>
<th>Revised Bloom’s Taxonomy</th>
<th>Webb’s DOK Level 1: Recall &amp; Reproduction</th>
<th>Webb’s DOK Level 2: Skills &amp; Concepts</th>
<th>Webb’s DOK Level 3: Strategic Thinking/Reasoning</th>
<th>Webb’s DOK Level 4: Extended Thinking</th>
</tr>
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<tbody>
<tr>
<td><strong>Remember</strong></td>
<td>o Recall, observe, &amp; recognize facts, principles, properties</td>
<td>o Specify and explain relationships (e.g., non-examples/examples, cause-effect)</td>
<td>o Use concepts to solve non-routine problems</td>
<td>o Relate mathematical or scientific concepts to other content areas, other domains, or other concepts</td>
</tr>
<tr>
<td>Retrieve knowledge from long-term memory</td>
<td>o Recall/identify conversions among representations or numbers (e.g., customary and metric measures)</td>
<td>o Make and record observations</td>
<td>o Explain, generalize, or connect ideas using supporting evidence</td>
<td>o Develop generalizations of the results obtained and the strategies used (from investigation or readings) and apply them to new problem situations</td>
</tr>
<tr>
<td>Recognize, recall, locate, identify</td>
<td>o Evaluate an expression</td>
<td>o Make and justify conjectures</td>
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<td>o Make and justify conjectures</td>
</tr>
<tr>
<td>Understand</td>
<td>o Locate points on a grid or number on number line</td>
<td>o Summarize results or concepts</td>
<td>o Explain thinking/reasoning when more than one solution or approach is possible</td>
<td>o Relate mathematical or scientific concepts to other content areas, other domains, or other concepts</td>
</tr>
<tr>
<td>Construct meaning, clarify, paraphrase, represent, translate, illustrate, give examples, classify, categorize, summarize, generalize, infer a logical conclusion, predict, compare/contrast, match like ideas, explain, construct models</td>
<td>o Solve a one-step problem</td>
<td>o Make basic inferences or logical predictions from data/observations</td>
<td>o Explain phenomena in terms of concepts</td>
<td>o Develop generalizations of the results obtained and the strategies used (from investigation or readings) and apply them to new problem situations</td>
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<tr>
<td>Apply</td>
<td>o Represent math relationships in words, pictures, or symbols</td>
<td>o Use models/diagrams to represent or explain mathematical concepts</td>
<td>o Use concepts to solve non-routine problems</td>
<td>o Relate mathematical or scientific concepts to other content areas, other domains, or other concepts</td>
</tr>
<tr>
<td>Carry out or use a procedure in a given situation; carry out (apply to a familiar task), or use (apply) to an unfamiliar task</td>
<td>o Read, write, compare decimals in scientific notation</td>
<td>o Make and explain estimates</td>
<td>o Make and explain estimates</td>
<td>o Relate mathematical or scientific concepts to other content areas, other domains, or other concepts</td>
</tr>
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<td>Analyze</td>
<td>o Follow simple procedures (recipe-type directions)</td>
<td>o Select a procedure according to criteria and perform it</td>
<td>o Design investigation for a specific purpose or research question</td>
<td>o Select or devise approach among many alternatives to solve a problem</td>
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<td>Break into constituent parts, determine how parts relate, differentiate between relevant-irrelevant, distinguish, focus, select, organize, outline, find coherence, deconstruct</td>
<td>o Calculate, measure, apply a rule (e.g., rounding)</td>
<td>o Solve routine problem applying multiple concepts or decision points</td>
<td>o Conduct a designed investigation</td>
<td>o Conduct a project that specifies a problem, identifies solution paths, solves the problem, and reports results</td>
</tr>
<tr>
<td>Evaluate</td>
<td>o Apply algorithm or formula (e.g., area, perimeter)</td>
<td>o Retrieve information from a table, graph, or figure and use it to solve a problem requiring multiple steps</td>
<td>o Use concepts to solve non-routine problems</td>
<td>o Analyze multiple sources of evidence</td>
</tr>
<tr>
<td>Make judgments based on criteria</td>
<td>o Solve linear equations</td>
<td>o Translate between tables, graphs, words, and symbolic notations (e.g., graph data from a table)</td>
<td>o Use &amp; show reasoning, planning, and evidence</td>
<td>o Analyze and draw conclusions from data, citing evidence</td>
</tr>
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<td>“UG” – unsubstantiated generalizations = stating an opinion without supporting evidence</td>
<td>o Make conversions among representations or numbers, or within and between customary and metric measures</td>
<td>o Construct models given criteria</td>
<td>o Translate between problem &amp; symbolic notation when not a direct translation</td>
<td>o Gather, analyze, and evaluate information</td>
</tr>
<tr>
<td>o Identify a pattern/trend</td>
<td>o Construct models given criteria</td>
<td>o Compare information within or across data sets or texts</td>
<td>o Analyze similarities/differences between procedures or solutions</td>
<td>o Gather, analyze, &amp; evaluate information to draw conclusions</td>
</tr>
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Use these Hess CRM curricular examples with most mathematics or science assignments or assessments.
# HESS Cognitive Rigor Matrix (Math-Science CRM):
## Applying Webb’s Depth-of-Knowledge Levels to Bloom’s Cognitive Process Dimensions

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<td>Specify and explain relationships, make and record observations</td>
<td>Use concepts to solve non-routine problems</td>
<td>Relate mathematical or scientific concepts to other content areas, other domains, or other concepts</td>
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<td>Retrieve knowledge from long-term memory, recognize, recall, locate, identify</td>
<td>Recall/identify conversions among representations or numbers (e.g., customary and metric measures)</td>
<td>Explain steps followed</td>
<td>Develop generalizations of the results obtained and the strategies used (from investigation or readings) and apply them to new problem situations</td>
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<td><strong>Understand</strong></td>
<td>Evaluate an expression</td>
<td>Make basic inferences or logical predictions from data/observations</td>
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<td>Represent math relationships in words, pictures, or symbols</td>
<td>Use models/diagrams to represent or explain mathematical concepts</td>
<td>Make and explain estimates</td>
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<td><strong>Apply</strong></td>
<td>Follow simple procedures</td>
<td>Select a procedure according to criteria and perform it</td>
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<td>Select or devise approach among many alternatives to solve a problem</td>
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<td>Carry out or use a procedure in a given situation; carry out (apply to a familiar task), or use (apply) to an unfamiliar task</td>
<td>Calculate, measure, apply a rule</td>
<td>Solve routine problem applying multiple concept decision points</td>
<td>Conduct a project that specifies a problem, identifies solution paths, solves the problem, and reports results</td>
<td></td>
</tr>
<tr>
<td><strong>Analyze</strong></td>
<td>Retrieve information from a table or graph to answer a question</td>
<td>Identify whether specific information is contained in graphic representations (e.g., table, graph, T-chart, diagram)</td>
<td>Compare information within or across data sets or texts</td>
<td>Analyze multiple sources of evidence</td>
</tr>
<tr>
<td>Break into constituent parts, determine how parts relate, differentiate between relevant/irrelevant, distinguish, focus, select, organize, outline, find coherence, deconstruct</td>
<td>Identify whether specific information is contained in graphic representations (e.g., table, graph, T-chart, diagram)</td>
<td>Organize or order data</td>
<td>Analyze and draw conclusions from data, citing evidence</td>
<td>Analyze complex/abstract themes</td>
</tr>
<tr>
<td><strong>Evaluate</strong></td>
<td>“UG” – unsubstantiated generalizations = stating an opinion without</td>
<td>Identify a pattern/trend</td>
<td>Compare/contrast figures or data</td>
<td>Gather, analyze, and evaluate information</td>
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<td>Make judgments based on criteria</td>
<td></td>
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Use these Hess CRM curricular examples with most mathematics of science assignments or assessments.
• In your small groups:
  • Analyze the assessment for questions 5, 6, and 7.
  • Remember to provide specific and actionable feedback!
HOW IMPORTANT ARE WORDS?

• Nearly a century of research (Whipple 1925, NAEP 2012)

• Feature of complex text that likely causes greatest difficulty (Nelson et al 2012)

• Vocabulary assessed in grade 1 predicts 30% of grade 11 comprehension (Cunningham & Stanovich 1997)
THE PROBLEM COMPOUNDS

- Pocket Change
- Compound Interest
- Interest no Compounding

Huge & Growing Fast!

Principle
THE MATHEW EFFECT: VOCABULARY
DO MORE

• Reading of multiple texts in math including articles.

• Vocabulary instruction in context—Important in Math
THE MATHEW EFFECT: VOCABULARY
DO LESS

• Random word lists

• Decontextualized vocabulary practice
MATHEMATICS VOCABULARY

• In your small groups, analyze for question 3. Include feedback and feed-forward analysis.
• So what about question 10?
THREE FACTS AND A FIB

• Ask students to write on an index card four statements about any content the class has just studied. Three of the statements (examples, equations, etc.) should be true and one should be false. Have students share their cards with each other to see if their fellow students can pick out the false statement.

• Teaching Numeracy-Margie Pearse
4.NBT.A.2

- $30 + 500 + 7 > 355$
- One thousand two hundred forty-three $> 300 + 2 + 40 + 2000$
- $277 < \begin{array}{c}
\text{\includegraphics[width=0.2\textwidth]{image1}} \\
\text{\includegraphics[width=0.2\textwidth]{image2}} \\
\text{\includegraphics[width=0.2\textwidth]{image3}} \\
\text{\includegraphics[width=0.05\textwidth]{image4}}
\end{array}$
- $\begin{array}{c}
\text{\includegraphics[width=0.2\textwidth]{image1}} \\
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\text{\includegraphics[width=0.2\textwidth]{image3}} \\
\text{\includegraphics[width=0.05\textwidth]{image4}}
\end{array} > 220$
SO, WHAT DOES THIS PROCESS LOOK LIKE AT THE DISTRICT OR BUILDING LEVEL?
Dear Teachers,

As a part of the administrative team’s learning we will be analyzing classroom assessments. To this end classroom assessments will need to be collected. Homework is not included in this part of the review. Over the next two weeks please collect assessments you give to your students. In addition to a copy of the master assessment with answers, please submit copies of one sample each from A, C, and F work or High, medium, and low work (for those not giving grades). Please make sure the student names are blacked out on the copies you send. Finally, please fill out and add the attached document to each of your assessments.

Thank you
### Criterion C.1

Focusing strongly on the content most needed for success in later mathematics

| Subject | Grade | Item Position | Point Value | Standard Alignment 1 | Standard Alignment 2 | Standard Alignment 3 | Standard Alignment 4 | Standard Alignment 5 | Do you agree with CCSS 1 alignment? | Do you agree with CCSS 2 alignment? | Do you agree with CCSS 3 alignment? | Do you agree with CCSS 4 alignment? | Do you agree with CCSS 5 alignment? | If you answered "No" in cols O.K, write the CCSS IDs of up to 5 ADDITIONAL aligned standards. [USE THE FOLLOWING FORMAT: HS.CC-DOMAIN.CLUSTER.STANDARD [e.g., HS.N-A.SSE.A.1]] |
|---------|-------|---------------|-------------|----------------------|----------------------|----------------------|----------------------|----------------------|------------------------------------|------------------------------------|------------------------------------|------------------------------------|------------------------------------|-------------------------------------------------------------------------------------------------
| Science/Ch HS | 4 | 18 | | | | | | | | | | | | |
| Science/Ch HS | 5 | 16 | | | | | | | | | | | | |
| Science/Ch HS | 6 | 12 | | | | | | | | | | | | |
| Science/Ch HS | 7 | 16 | | | | | | | | | | | | |
| English/En HS | 1 | 2 | W1 | W2 | W3 | W4 | R16 | No | No | No | No | No | No | None |
| English/En HS | 2 | 2 | W1 | W2 | W3 | W4 | R16 | No | No | No | No | No | No | None |
| English/En HS | 3 | 2 | W1 | W2 | W3 | W4 | R16 | No | No | No | No | No | No | None |
| English/En HS | 4 | 2 | W1 | W2 | W3 | W4 | R16 | No | No | No | No | No | No | None |
| English/En HS | 5 | 2 | W1 | W2 | W3 | W4 | R16 | No | No | No | No | No | No | None |
| English/En HS | 6 | 2 | W1 | W2 | W3 | W4 | R16 | No | No | No | No | No | No | None |
| English/En HS | 7 | 2 | W1 | W2 | W3 | W4 | R16 | No | No | No | No | No | No | None |
| English/En HS | 8 | 2 | W1 | W2 | W3 | W4 | R16 | No | No | No | No | No | No | None |
| English/En HS | 9 | 2 | W1 | W2 | W3 | W4 | R16 | No | No | No | No | No | No | None |
| English/En HS | 10 | 2 | W1 | W2 | W3 | W4 | R16 | No | No | No | No | No | No | None |
| English/En HS | 11 | 2 | W1 | W2 | W3 | W4 | R16 | No | No | No | No | No | No | None |

All aligned standards (inc to which you sa
CONNECT WITH ME AND CONTINUE THE CONVERSATION!

• Amy Youngblood
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  • @EduOptimus1