

Using Data and Formative Assessment to Drive Instruction

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Professional Development Goals and Objectives

1. Develop a growth mindset around using data.

Accomplish this by being able to:

- Ask effective questions about student achievement and program improvement
- Identify and distinguish different types of data (quantitative and qualitative) that can be used to raise questions and challenge assumptions
- Seek patterns in data to help formulate future ways of proceeding
- Engage in collaborative inquiry with data (e.g., share practices and data with colleagues)

2. Learn basic tools of statistical analysis.

Accomplish this by being able to:

- Develop comfort with basic descriptive statistics (e.g., means, trends, standard deviation)
- Recognize common representations of statistical data (e.g., read tables, graphs)
- Understand concepts of validity, reliability, and generalizability

3. Analyze and interpret common forms of school data.

Accomplish this by being able to:

- Interpret standardized test reports
- Synthesize multiple data sources
- Identify the limitations of available data sources
- Distinguish between observation and interpretation
- Appreciate how assumptions and cultural bias influence interpretation

4. Apply data analysis skills in the classroom or program area.

Accomplish this in the classroom by being able to:

- Identify and collect common forms of classroom data
- Use formative and summative student assessment data to provide feedback and inform instruction
- Articulate the purpose and meaning of a grade, and establish grading systems that reflect this purpose.
- Use summative assessment data to evaluate student achievement of course goals
- Communicate assessment results and interpretations with students and parents

Accomplish this through program evaluation by being able to:

- Identify and collect common forms of program data
- Match data types with program evaluation questions
- Apply methods of statistical analysis appropriate to the evaluation
- Integrate data collection and analysis methods within the CIPP process



Demographic Data: Who Are Our Learners?

1. Individually, use the first column of the template below to make predictions about the student demographics represented in your school/district community (number for total enrollment, percentage for others).
2. Compare your predictions with those of your tablemates. Explain the thinking behind your predictions.
3. Examine the actual demographic numbers of your school/district community and enter these data in the second column. As a table group, discuss:
 - What surprises you about the data?
 - What questions are raised?
 - What inferences might you make?
 - What implications might there be for the school? For your practice?
4. Identify a spokesperson for your table to report the highlights of the table discussion.

	Predictions	Actual #	Notes
Total Enrollment # (as of 20__-20__)			
Demographic Categories		Actual %	
Male			
Female			
Latino			
Asian			
Filipino			
Caucasian			
African American			
Pacific Islander			
American Indian/Alaskan			
Magis Students*			
Identified Learning Disabled			

*Meet one or more of the following:

- first in the family to go to college
- low income
- typically under represented minority (TURM)

Group Roles

(cut before distributing)

Facilitator

- Remains neutral, but fully engages as a participant
- Keeps team on task by being mindful of the process
- Encourages everyone to participate
- Protects team members from attack
- Negotiates role with the group

Recorder

- Supports facilitator
- Records team language on charts
- Asks the team for corrections
- Writes legibly, large, and in color
- Works with team to agree on formats for graphs that are created on chart paper

Materials Manager

- Gathers materials needed for team
- Works with facilitator to make copies of data and information for team
- Distributes materials as needed during team meeting
- Keeps materials organized and stores until next meeting if needed

Dialogue Monitor

- Reminds team which phase of the Data-Driven Dialogue process the team is in (predict, go visual, observe, infer/question)
- Uses No-Because sign as needed
- Suggests that the team use chart paper to label “parking lot” to save inferences for later
- Identifies and alerts team to equity issues
- Observes and gives feedback related to group norms

Timekeeper

- Works with facilitator before the meeting, if possible, to establish time allotments for the agenda items
- Monitors time for each section
- Gives 1-minute warnings for discussion ending



Norms of Collaboration Cards

(cut before distributing)

Pausing

Pausing slows down the “to and fro” of discussion. It provides for “wait time,” which has been shown to dramatically improve thinking. It signals to others that their ideas and comments are worth thinking about, dignifies their contributions, and implicitly encourages future participation. Pausing enhances discussion and greatly increases the quality of decision making.

Paraphrasing

To paraphrase is to recast into one’s own words, to summarize, or to provide an example of what has just been said. It helps members of a team hear and understand each other as they evaluate data and formulate decisions, and it helps to reduce group tension by communicating the attempt to understand. Signal your intention to paraphrase (“So, you’re suggesting...”), and choose a level for the paraphrase: (1) acknowledge and clarify; (2) summarize and organize; or (3) shift the focus to a higher or lower level.

Paying Attention to Self and Others

Collaborative work is facilitated when each team member is explicitly conscious of self and others—not only aware of what he or she is saying, but also how it is said and how others are responding to it. We need to be curious about other people’s impressions and understandings but not judgmental. As we come to understand someone else’s way of processing information, we are better able to communicate with them.

Presuming Positive Intentions

This is the assumption that other members of the team are acting from positive and constructive intentions, even if we disagree with their ideas. Presuming positive presuppositions is not a passive state; rather, it needs to become a regular part of one’s verbal responses. The assumption of positive intentions is an aspect of the concept of a “loyal opposition,” and it allows one member of a group to play “the devil’s advocate.” It builds trust, promotes healthy disagreement, and reduces the likelihood of misunderstanding and emotional conflict.

(cont. next page)



Probing for Specificity

Probing seeks to clarify something that is not yet fully understood. More information may be required or a term may need to be more fully defined. Clarifying questions can be either specific or open ended, depending upon the circumstances. Ask for clarification of vague nouns and pronouns (e.g., “they”), action words (e.g., “improve”), comparators (e.g., “best”), rules (e.g., “should”), and universal quantifiers (e.g., “everyone”).

Pursuing a Balance between Advocacy and Inquiry

Both advocacy and inquiry are necessary components of collaborative work. The intention of advocacy is to influence others’ thinking; the intention of inquiry is to understand their thinking. Highly effective teams consciously attempt to balance these two components. Inquiry provides for greater understanding. Advocacy leads to decision making. Maintaining a balance between advocating for a position and inquiring about the positions held by others helps create a genuine learning community.

Putting Ideas on the Table and Pulling Them Off

Ideas are the heart of a meaningful discussion. Members need to feel safe to put their ideas on the table for discussion. To have an idea be received in the spirit in which you offer it, label your intentions: “This is one idea...” or “Here’s a thought....” The other half of this norm is equally important: knowing when an idea may be blocking dialogue or “derailing” the process and therefore should be taken off the table.

Adapted from Robert J. Garmston and Bruce M. Wellman, *The Adaptive School: A Sourcebook for Developing Collaborative Groups*, 1999. Norwood, MA: Christopher Gordon, pp. 37-47. Used with permission in N. Love, K. Stiles, S. Mundry, and K. DiRanna, *The Data Coach’s Guide to Improving Learning for All Students: Unleashing the Power of Collaborative Inquiry*, Thousand Oaks, CA: Corwin Press, 2008. All rights reserved.



Data-Driven Dialogue



Adapted from *Data-Driven Dialogue* by Bruce Wellman and Laura Lipton, MiraVia LLC, 2004

From N. Love, K. Stiles, S. Mundry & K. DiRanna, *A Data Coach's Guide to Improving Learning for All Students: Unleashing the Power of Collaborative Inquiry*, Thousand Oaks, CA: Corwin Press, 2008. All rights reserved.



Data-Driven Dialogue Protocol

A core tool in your analysis toolkit is Data-Driven Dialogue, a four-phase protocol for having powerful and focused conversations about data. Data-Driven Dialogue helps teams to make sense of the data together before moving on to data-driven decision-making. In Phase 1, teams predict what they will see in their data before analyzing the results, surfacing their assumptions and whetting their appetite to dig into the data. In Phase 2, they “go visual,” creating colorful, easy-to-interpret representations of their results. These visuals help keep the dialogue focused on the data *over there*, reducing defensiveness and aiding in the sense-making. Phase 3 is the observation phase, where members describe what they are seeing in the data, being careful to separate the facts from interpretations. This is followed by Phase 4: Infer/Question, which entails drawing inferences and surfacing questions the data are raising. Data-Driven Dialogue is an important precursor to taking action, helping to assure that the actions taken are guided by thoughtful data analysis.

Purpose

- To engage in a process for analyzing data in a respectful, thoughtful manner that creates shared meaning of the data
- To analyze data and student work according to a protocol that leads to effective and targeted action

Suited for Which Type of Assessment Data

- Any type

Materials

- Data-Driven Dialogue: Note-Catcher
- No-Because Sign
- Data-Driven Dialogue: Go-Visual Tools

Process

Review assessment items and/or do task on selected items	Engage in Data-Driven-Dialogue				Prepare to take action
	Phase 1: Predict	Phase 2: Go Visual	Phase 3: Observe	Phase 4: Infer/ Question	

Review Assessment Items and Do Task on Selected Items

- Review relevant unit essentials, learning targets, success criteria, and assessment items.
- For frequently missed items or single open-response items, do the task with your team, share solutions and strategies, and consider how students might have approached the task.
- Brainstorm what students would need to know and be able to do to complete the task successfully.



Phase 1: Predict

Surface assumptions, predictions, and questions before looking at the data (e.g., “I assume that...,” “I predict that...,” “I wonder if...”).

Guiding questions:

- With what assumptions are we entering?
- What predictions are we making?
- What questions are we asking?
- What are the possibilities for learning here?

Phase 2: Go Visual

Display large, visually vibrant, colorful, and easy to read displays of the data (e.g., color-coded charts or graphs). See Data-Driven Dialogue: Go-Visual Tools for additional information about this phase.

Phase 3: Observe

Examine the data for patterns or trends—just the facts, not interpretations or explanations (e.g., “I am struck by...,” “I notice that...”).

Guiding questions:

- What important points pop out?
- What patterns or trends are emerging?
- What seems to be surprising or unexpected?
- What have we not yet explored?

Phase 4: Infer/Question

Generate multiple possible explanations or hypotheses for what was observed (e.g., “A possible explanation is...,” “That may be because...,” “A question I have now is...”).

Guiding questions:

- What possible explanations do we have for the patterns we are seeing?
- What inferences can we draw?
- What tentative conclusions might we draw?
- How can we find out which of our hypotheses is right?
- What questions do we have?
- What additional data might we explore to verify our explanations?

Prepare to Take Next Steps:

- Summarize findings in a problem/goal statement
- Identify priorities for solutions, e.g. verifying causes, reteaching, extension

Source: Adapted from N. Love, K. E. Stiles, S. Mundry, and K. DiRanna. (2008). *The Data Coach's Guide to Improving Learning for All Students: Understanding the Power of Collaborative Inquiry*. Thousand Oaks, CA: Corwin. Based on the work of B. Wellman and L. Lipton.



Data-Driven Dialogue: Note-Catcher

Predictions	
Observations	Inferences/ Questions
Problem/Goal	
Further Investigation	Next Steps: Who? What? By When?



Data-Driven Dialogue: No-Because Sign



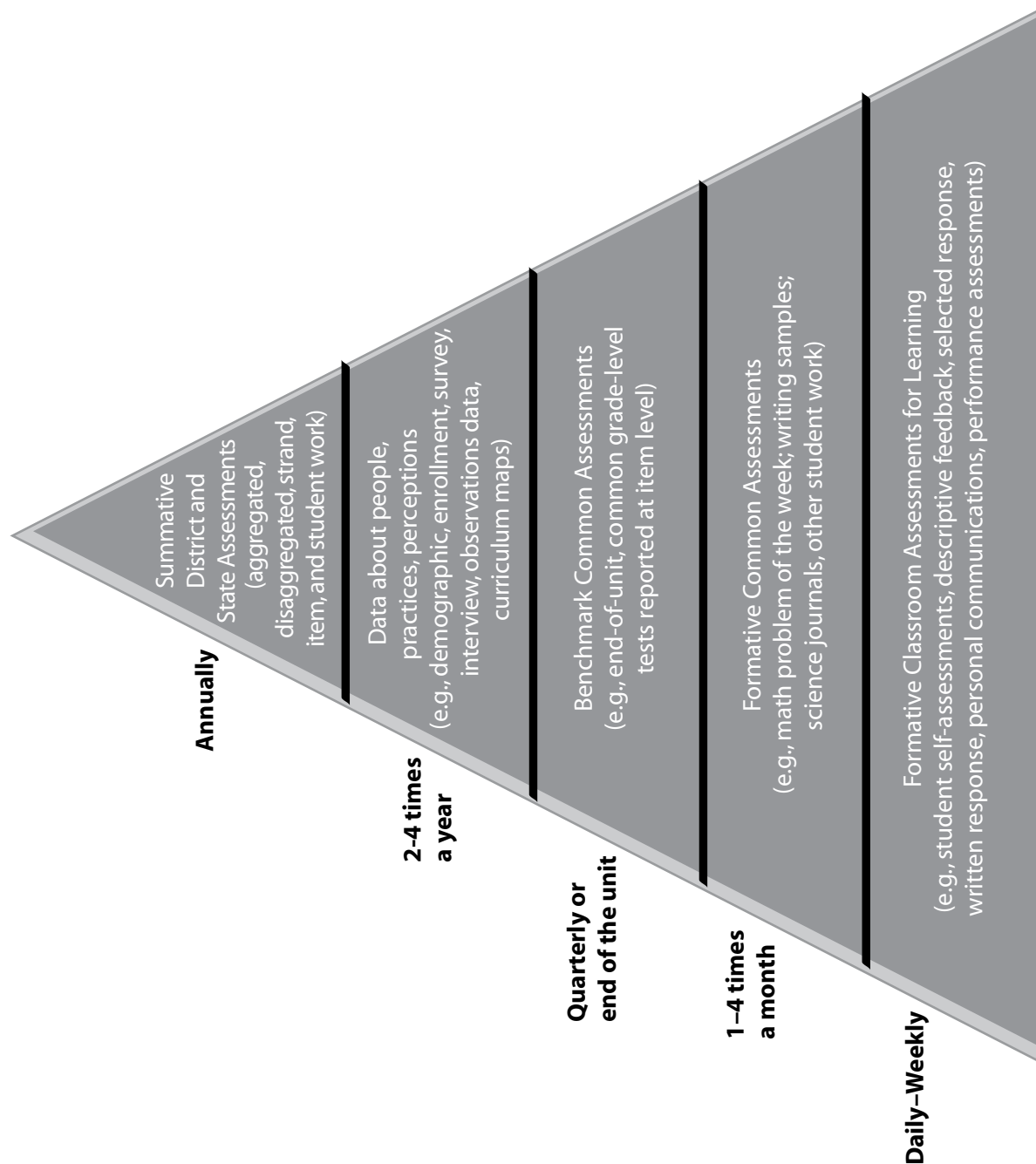
Data-Driven Dialogue: Go-Visual Tools

The purpose of the go-visual phase of Data-Driven Dialogue is to provide easy to read and interpret displays of data in order to facilitate the conversations that teams engage in during Phases 3 and 4. The end goal of going visual isn't the displays themselves, but rather the conversations that they enable. Since creating these displays can potentially take up precious individual and team time, it's important to minimize the time investment in the creation process itself. Fortunately, there are many tools and techniques that can assist teachers and teams to go visual efficiently. Following is a list of go-visual tools that can be used in addition to the protocol-specific tables included in each of the data and student work protocols:

- Stoplight highlighting is a technique that teams can use to visually differentiate among students' performances (i.e., positive results are highlighted in green, data that represents caution are highlighted in yellow, and performances that demand immediate attention are highlighted red). Teams determine the criteria to use for the different colors and the action they represent. It can be done with data tables and graphically. See the stoplight highlighting examples below.
- There are many technology-based tools that both go visual graphically and/or automatically stoplight highlight and collate teacher/team-created formative assessment data. Many of these have the added bonus of serving as all-student response systems, which simultaneously gather students' responses and go visual:
 - www.polleverywhere.com
 - www.gradeable.com
 - www.socrative.com
 - www.mentimeter.com
 - www.gosoapbox.com
 - www.testmoz.com



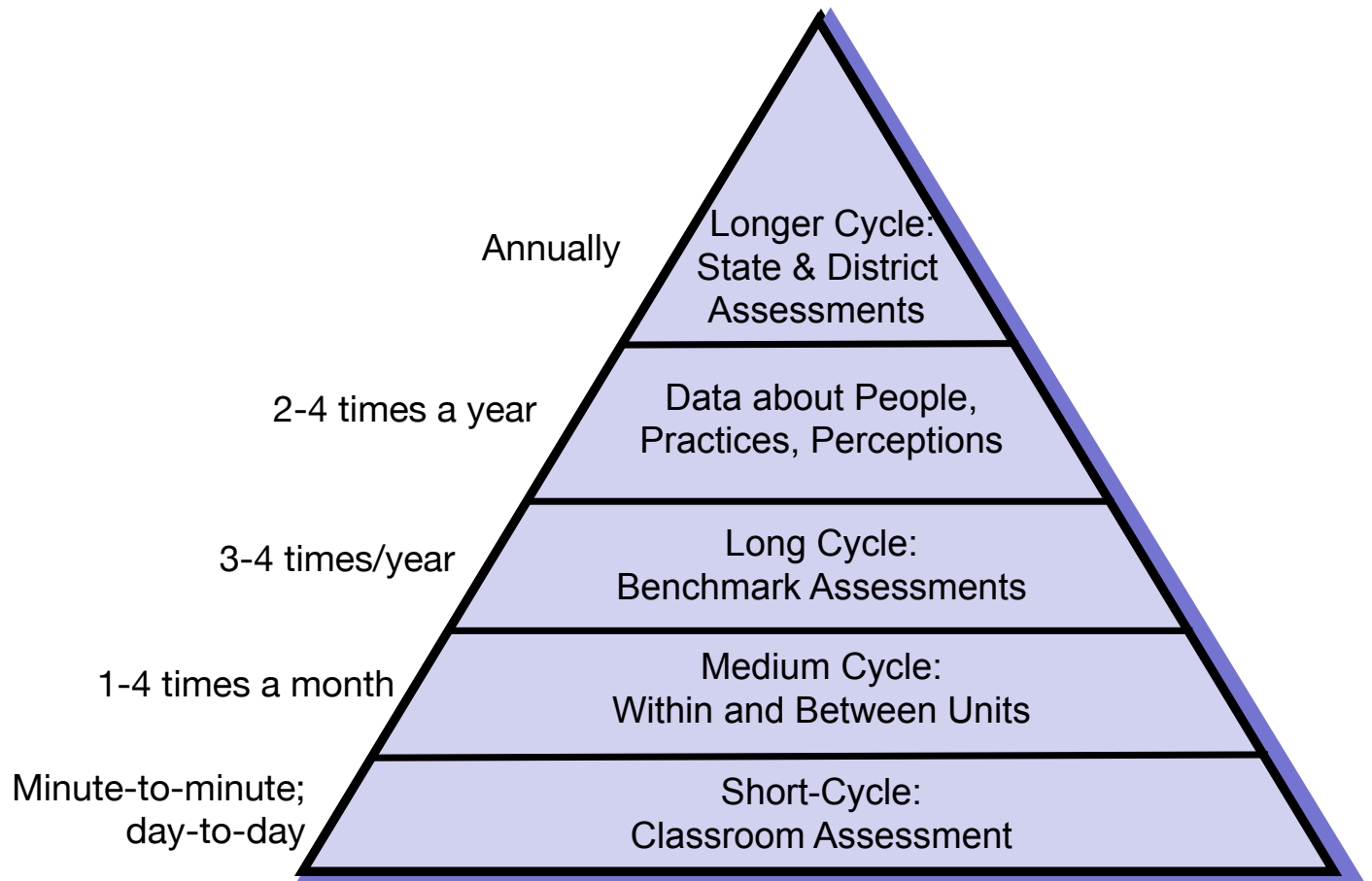
The Data Triangle



From N. Love, K. Stiles, S. Mundry & K. DiRanna, *A Data Coach's Guide to Improving Learning for All Students: Unleashing the Power of Collaborative Inquiry*, Thousand Oaks, CA: Corwin Press, 2008. All rights reserved.



Data Pyramid: What Kind of Data? How Often?



Adapted from N. Love, K. Stiles, S. Mundry, and K. DiRanna, *The Data Coach's Guide to Improving Learning for All Students: Unleashing the Power of Collaborative Inquiry*, Thousand Oaks, CA: Corwin Press, 2008. All rights reserved.



Three Types of Assessment Data

Type of Data	Pre-Assessment for Learning	Formative Assessment for Learning	Summative Assessment of Learning
What?	Learning about your students' cultural/ linguistic background (C), academic readiness (including students' skills and knowledge) (A), metacognitive skills (M), and personal interests (P)	"A planned process in which assessment-elicited evidence of students' status is used by teachers to adjust their ongoing instructional procedures or by students to adjust their current learning tactics" (Popham, 2008, p. 6)	Documenting individual or group achievement or mastery of standards
Why?	<ul style="list-style-type: none"> • To design instruction that meets students' needs • To determine students' entry points into the curriculum • To strengthen cultural proficiency in our teaching • To build personal relationships • To motivate students 	<ul style="list-style-type: none"> • To diagnose students' learning needs or preconceptions • To monitor progress • To provide timely feedback to students • For teachers, to plan next steps in instruction • For students, to plan next steps in their learning 	<ul style="list-style-type: none"> • For reporting, accountability, grades, graduation, and promotion
How?	<ul style="list-style-type: none"> • Surveys (interests, cultural background, metacognitive skills) • Language assessments • Quizzes, probes, observations • Academic achievement data 	<ul style="list-style-type: none"> • Getting inside students' heads • Activators • Probes/products/performances • Summarizers • Feedback • Student self-assessment and goal-setting • Quick sort • Individual student display and analysis • Criteria analysis 	<ul style="list-style-type: none"> • Achievement tests • Final exams • Placement tests • Benchmark assessments (when used summatively)
When?	<p>C, P – beginning of school year and when new students arrive</p> <p>A – beginning of school year; before a unit/lesson</p> <p>M – periodically</p>	While learning is underway – beginning, middle, and end of lesson(s); before summative assessment	End of instructional sequence, e.g., unit, course, academic year
Inquiry Question	Who are my students?	What do my students know/need know?	What have they learned?

Sources: Rain Bongolan, Laura Gschwend, and Anne Watkins. *Especially for Mentors: Differentiation Strategies/Tools That Accelerate Teacher Effectiveness*. Presentation at NSDC annual meeting, Dallas, December 4, 2007.

W. James Popham. 2008. *Transformative Assessment*. Alexandria, VA: ASCD.

Richard J. Stiggins, Judith A. Arter, Jan Chappuis, and Stephen Chappuis. 2004. *Classroom Assessment for Student Learning: Doing It Right—Using It Well*. Portland, OR: Assessment Training Institute, p. 33.



Components of an Assessment System: Formative and Summative

Mindset		
<p>“Although a given test may be employed in connection with a summative assessment function, it is possible (if the test is properly crafted) for this very same test to be used also as part of the formative assessment process. In other words, tests, all by themselves, are neither formative nor summative. It is the use to which a given test’s results are put that makes the assessment part of the formative-assessment process or, instead, finds it contributing to a summative-assessment decision.” (Popham, 2014, p. 291)</p>		
	Formative Assessments Assessment <i>for</i> Learning	Summative Assessments Assessment <i>of</i> Learning
What?	<p>“An assessment functions formatively to the extent that evidence about student achievement is elicited, interpreted, and used by teachers, learners, or their peers to make decisions about the next steps in instruction that are likely to be better, or better founded, than the decisions they would have made in the absence of that evidence.” (Wiliam, 2011, p. 43)</p>	<p>“Summative assessments typically are administered at the end of an instructional sequence and provide evidence to certify students’ competence and to assign grades or marks. Summative assessments tend to be directed toward a much more general appraisal of learning outcomes. Instead of being used to guide improvements, summative assessments provide teachers with culminating evidence that helps them decide if students have mastered certain content and skills, achieved specific standards, and/or are ready to move on to the next level of learning.” (Guskey & Jung, 2013, p. 39)</p>
Why?	<ul style="list-style-type: none"> • To design instruction that meets students’ needs • To determine students’ entry points into the curriculum • To diagnose students’ learning needs or preconceptions • To monitor progress • To provide timely feedback to students • For teachers, to plan next steps of instruction • For students, to plan next steps in their learning 	<ul style="list-style-type: none"> • To verify the extent of student learning with regard to standards, benchmarks, unit essentials, etc. • To provide grades
How?	<ul style="list-style-type: none"> • Diagnostic questions or probes • All-student response systems (e.g., ABCD cards, mini-whiteboards, electronic clickers) • Exit tickets/summarizers • Quick quizzes • Any other assessment, such as end-of-unit, when used for the above purposes 	<ul style="list-style-type: none"> • End-of-unit assessments • Final exams • Performance tasks/assessments • Portfolio assessments • Benchmark or interim assessments • Achievement tests • Grades • SATs/ACTs
When?	At any point in the instructional cycle	At the end of an instructional cycle



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Guskey, T. R., & Jung, L. A. (2013). *Answer to Essential Questions about Standards, Assessments, Grading, and Reporting*. Thousand Oaks, CA: Corwin.

Popham, W. J. (2014). *Classroom Assessment: What Teachers Need to Know* (7th ed.). Boston: Pearson.

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Formative Assessment: Two Definitions

Formative assessment is the process “we conduct throughout teaching and learning to diagnose student needs, plan our next steps in instruction, provide students with feedback they can use to improve the quality of their work, and help students see and feel in control of their journey to success” (Stiggins et al., 2004, p. 31).

Formative assessment is “A planned process in which assessment-elicited evidence of students’ status is used by teachers to adjust their ongoing instructional procedures or by students to adjust their current learning tactics” (Popham, 2008, p. 6).

Research on Formative Assessment

- 250 research studies from several countries establish that improving formative assessments raises student achievement.
- Some studies showed that (so-called) low-achievers make the greatest gains.
- Assessments that bring about these gains:
 - Provide descriptive feedback to students
 - Actively involve students
 - Inform adjustments in teaching and learning
 - Increase motivation and build students’ self-esteem
 - Provide accurate data
- “Few interventions in education come close to having the same level of impact as assessments *for* learning” (Stiggins et al., 2004, p. 37).

Sources: Paul Black and Dylan Wiliam. 1998. *Assessment and Classroom Learning*. Assessment in Education, vol. 5, no. 1, pp. 7-74.

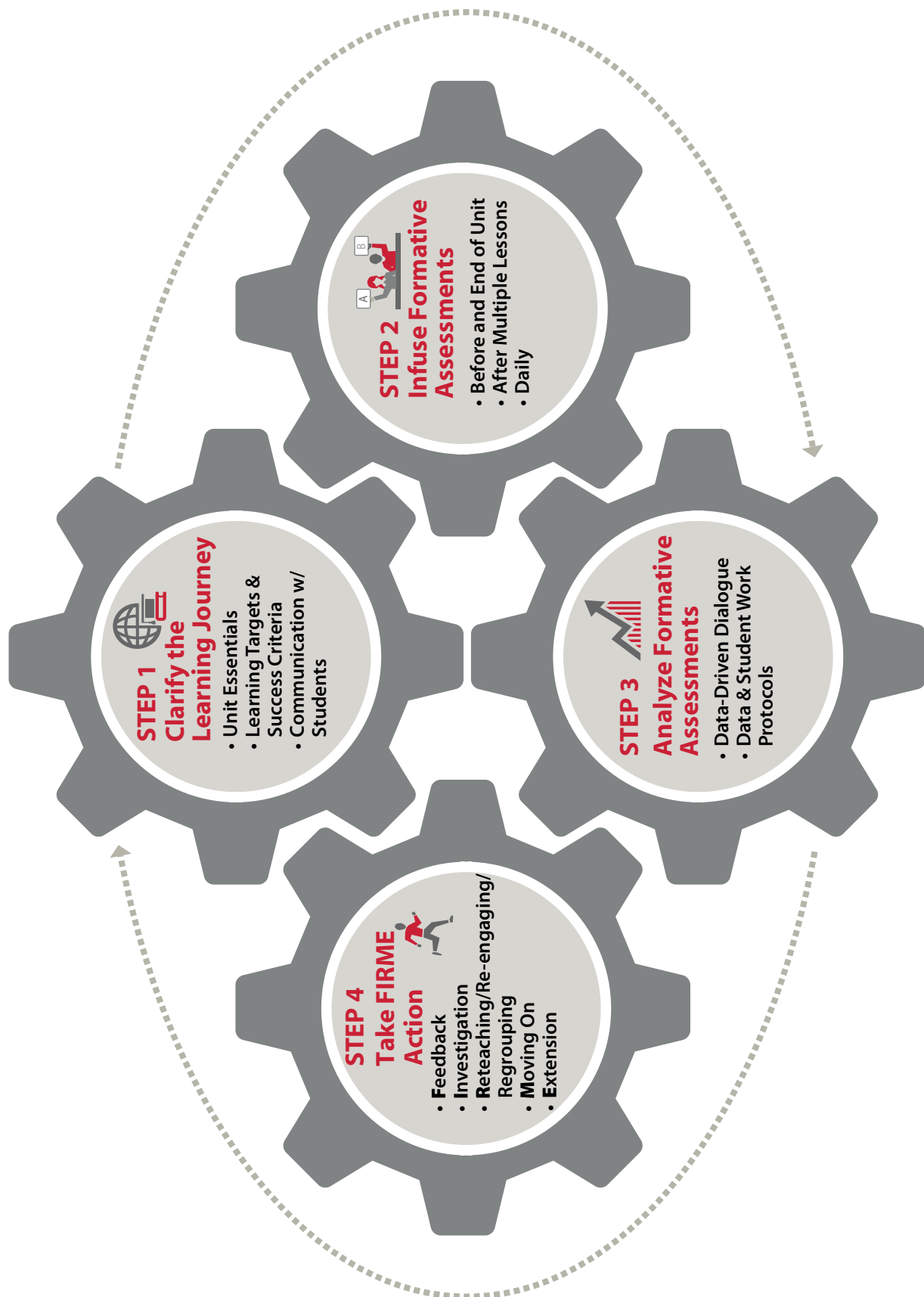
Paul Black and Dylan Wiliam. 1998. Inside the Black Box: Raising Standards Through Classroom Assessment. *Phi Delta Kappan*, vol. 80, no. 2 (October), pp. 139-140.

W. James Popham. 2008. *Transformative Assessment*. Alexandria, VA: ASCD.

Richard J. Stiggins, Judith A. Arter, Jan Chappuis, and Stephen Chappuis. 2004. *Classroom Assessment for Student Learning: Doing It Right—Using It Well*. Portland, OR: Assessment Training Institute.



Formative Assessment for Results (FAR) Cycle with Detail



Formative Assessment Exercise

Directions: Some of the following scenarios are examples of good formative assessment. Some are not. Please place a check (✓) next to each scenario that is an example. Revise any that are not; rewrite them to make them examples of formative assessment.

1. ____ A mathematics curriculum supervisor analyzes the scores of the middle school students on the state tests and notes that students seem to be scoring poorly on items involving ratio and proportion. She makes ratio and proportion the focus of professional development activities offered to teachers.
2. ____ Each year a group of Algebra I teachers review students' performance on a statewide Algebra I test, looking particularly at the facility (proportion correct) for each item. When item facilities are lower than expected, they look at how that aspect of the curriculum was planned and delivered and at how the instruction can be strengthened in the following year.
3. ____ A school district administers interim tests tied to the curriculum at six to ten week intervals to check on student progress.
4. ____ A middle school science teacher's curriculum allocates 14 periods to a unit on pulleys and levers. When all the content is covered in the first 11 periods, the teacher gives students the unit test during period 12 and then moves on to the next unit. She now has some breathing room as she is ahead of the pacing guide.
5. ____ A history teacher, who has been teaching about the issue of bias in historical sources, at the end of the lesson asks the students to respond to the following question on an index card: "Why are historians concerned about bias in historical sources?" After reading the cards, the teacher concludes that the students' answers indicate a good enough understanding for the teacher to move on to a new chapter.
6. ____ An AP calculus teacher has been teaching students about graph sketching and wants to check quickly that the students have grasped the main principles. She asks the students to "Please sketch the graph of $y = \frac{1}{1+x^2}$ " on their whiteboards. When students hold them up, she sees the class has understood and moves on.
7. ____ After showing a video on the dangers of smoking, a health teacher asks questions to make sure students have understood the messages. Most of the students in the class raise their hands to answer. When the five or six students she calls on get the answers correct, she decides it's okay to move on.
8. ____ After explaining the difference between a compound sentence and a complex sentence, an English teacher asks her students to indicate their understanding with thumbs up if they understand, thumbs to the side if they're not sure if they understand, and thumbs down if they don't understand. When most of the students give the thumbs up signal, she moves on to the compound-complex sentence.

Adapted from *Embedded Formative Assessment* by Dylan Wiliam, Solution Tree Press, 2011.



Self-Assessment of Strategies for Assessment for Learning

	Not At All	About 25%- 50% of the time	About 50%- 75% of the time	Every Class Every Day
Of the lessons I teach each week, how many have clear learning targets that are communicated to students?				
How often are criteria for assignments communicated to my students?				
How much class time is devoted to guiding my students through the analysis of strong and weak examples of work?				
How often do my students analyze strong and weak examples of work to build understanding of important criteria?				
How often do my students receive feedback, and are held accountable for using that feedback to revise/extend work?				
How often are my students prompted to self-assess their work by identifying evidence of criteria?				
How often do my students set goals, create plans of action, monitor goals, and track progress toward their goals?				

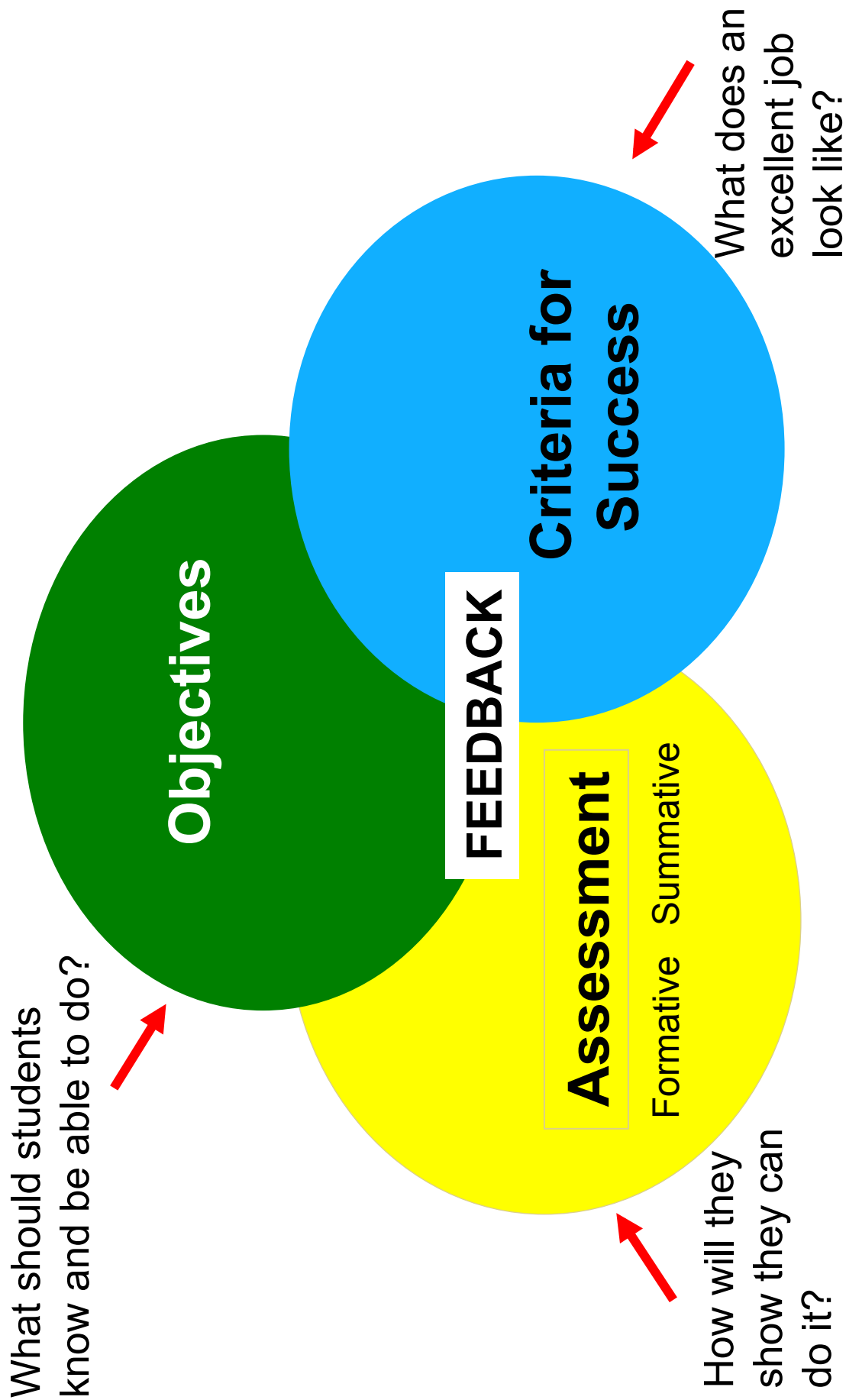


Components of an Assessment System: Short-, Medium-, and Long-Cycle

Assessment Cycle	How Will the Information Be Used?		When? Frequency?	How?
	Summative Use	Formative Use		
Short-Cycle		<ul style="list-style-type: none"> To determine where each student is in his/her learning right now To determine the gaps between students' current learning and the unit essentials To provide timely feedback to students For teachers, to plan next steps of instruction For students, to plan next steps in their learning 	<p>Within and between lessons</p> <p>Minute-to-minute; day-to-day</p>	<ul style="list-style-type: none"> Diagnostic questions or probes All-student response systems (e.g., ABCD cards, mini-whiteboards, electronic clickers) Exit tickets/summarizers Quick quizzes
Medium-Cycle	<ul style="list-style-type: none"> To verify the extent of student learning with regard to standards, unit essentials, etc. To provide grades 	<ul style="list-style-type: none"> To determine students' entry points into the curriculum To diagnose students' learning needs or preconceptions To design instruction that meets students' needs To inform reteaching, extension, and regrouping To determine if students are progressing as planned 	<p>Within and between teaching units</p> <p>1 to 4 weeks</p>	<ul style="list-style-type: none"> Diagnostic assessments or probes Pre-assessments End-of-unit assessments Performance tasks/assessments Portfolio assessments Quizzes
Long-Cycle		<ul style="list-style-type: none"> To determine if students are progressing as planned To determine where students will be at the end of the school year 	<p>Across units, terms</p> <p>9 weeks, end of semester</p>	<ul style="list-style-type: none"> Benchmark/interim assessments Annual testing Grades

Informed by William, D. (2007). What Does Research Say the Benefits of Formative Assessment Are? *Assessment Research Brief*. Alexandria, VA: National Council of Teachers of Mathematics.

Formative Assessment: Clarify the Learning Journey



Formative Assessment Short Cycle: Step 1

Communicating Objectives

1. Identify the **most worthwhile** objective for these students at this time by analyzing the materials you've picked or that the curriculum presents.
2. Determine whether the students have **adequate prior knowledge** for the target you have in mind.
3. **Compose** the objective in **mastery language** so you yourself know what student performance ("will be able to do") you would take as evidence of mastery.
4. **Communicate the objective** to the students in student friendly language.
5. Check for a minute or two to **be sure the students understand the objective**, i.e., unpack it.
6. Be sure its **posted** somewhere in the room so students can refer back to it.
7. Tell the students the **series of steps** they'll be going through to **meet the objective**.
8. Get the students to understand **why** the objective is something **worth learning**, i.e., the reason it is important.
9. Establish the **criteria for success** in performances or products the students will be producing.
10. Have **students self-evaluate** according to the **criteria for success**.
11. **Return** to what the objective is, **at least once during** the lesson and **again at the end**.
12. Be sure to **distinguish** in your planning between **thinking skill objectives** and **mastery objectives** in the academic disciplines.



Formative Assessment Short Cycle: Communicating Criteria for Success

The criteria for success...

- begin by stating the name of the product or performance
- describe a proficient product or performance
- are kid friendly
- are sufficient
- are appropriate (a match for what will help students “hit the target performance”)

1. Your reading response connects to...
 - the main idea of the story
 - or to a specific event in the story
 - or one of the characters in the story.
2. Each scale drawing...
 - is drawn in pencil
 - contains straight lines, drawn with a ruler
 - indicates the dimension of each room with arrows
 - has a title block in the lower right corner (see p. 130 for example):
 - The title block has...
 - your name
 - scale
 - title for drawing
 - contains no mathematical errors
 - Dimensions of rooms are drawn correctly to scale.
 - A separate sheet of paper is provided with calculations.
 - all objects in the drawing (chairs, desks, or tables) drawn to the correct scale
3. Your worksheet includes...
 - evidence of work with...
 - sketching on original polygon grid
 - summary or explanation of strategy used
 - calculations
 - a summary or explanation of strategy used
 - reasonable and efficient use of strategies
 - the correct answer
4. Your math reflection...
 - re-states the question in response.
 - includes an example
 - explains example
 - has correct answers
 - uses math vocabulary appropriately



5. The open response...
 - states a correct definition of an inverse function.
 - states the correct domain and range of an inverse function.
 - states in words the inverse of the given function.
 - provides the correct table of the inverse function, given the table of the original function.
 - provides the correct arrow diagram of the inverse function, given the arrow diagram of the original function.
6. Notes are taken on a 3-column chart and include...
 - drawings of the brain structures
 - a description of the function of each structure
 - the region of the brain where each structure is located
7. Your clay pot ...
 - has a centered cylinder with even wall thickness from top to bottom.
 - has straight walls that are at least 5 inches tall.
 - has been removed from the wheel and placed in the damp box to prepare for the next step which is footing.
8. Your chart includes...
 - quotes of significance to a character or larger idea in the chapter
 - proper citation of quotes
 - thoughtful and complete explanations of significance
 - at least two themes that can be applied to one or more quotes
9. The persuasive paragraph includes...
 - a position statement
 - at least three supporting details
 - correctly cited quotations
 - a call-to-action
 - a connection drawn between the friendship Lennie and George share, and the friendship Candy and his dog share
10. A successful Periodic People Sort activity includes...
 - all rows and columns numbered accurately.
 - all elements arranged by atomic number and mass.
 - an individual description of the traits discussed within your subgroups (of family and rows) which includes at least 3 common traits of all of the elements in your section
11. Notes taken during the mini-lecture will include
 - definitions of the terms Charles law, Boyles law, pressure, volume, temperature, and gas, lab safety procedures
 - hypothesis/ predictions on graphing Charles and Boyles law
 - The graph will include
 - A key to indicate the specific law
 - Different colors to indicate the different laws
 - Correctly labeled axis



Eight Strategies of Assessment for Learning

WHERE AM I GOING?

1. Provide students with a clear and understandable vision of the learning target.
2. Use examples and models of proficient and not yet proficient work.

WHERE AM I NOW?

3. Get inside students' heads.
4. Offer regular descriptive feedback.
5. Teach students to self-assess and set goals.

HOW CAN I CLOSE THE GAP?

6. Design lessons to focus on one learning target or aspect of quality at a time.
7. Teach students focused revision.
8. Engage students in self-reflection, and let them keep track of and explain learning.

Source: Adapted with permission from J. Chappuis. 2007. *Learning Team Facilitator Handbook: A Resource for Collaborative Study of Classroom Assessment for Student Learning*. Portland, OR: Pearson Assessment Training Institute, p. 49.



Formative Assessment Tools

<p>To use at the beginning of a unit</p>	<p>To use during the lesson</p>
<p>To use at the end of a lesson</p>	<p>To use prior to a summative assessment</p>



Academic Readiness Pre-Assessment

What?

- Content-specific prerequisite concepts and skills
- Reading and writing skills

Why?

“Challenges...must be at the proper level of difficulty in order to be and remain motivating: tasks that are too easy become boring; tasks that are too difficult cause frustration.”

(National Research Council. 1999. *How People Learn: Brain, Mind, Experience, and School*. Washington, DC: National Academy Press, p. 49.)

“Diagnostic assessment is as important to teaching as a physical exam is to prescribing an appropriate medical regimen. At the outset of any unit of study, certain students are likely to have already mastered some of the skills that the teacher is about to introduce, and others may already understand key concepts. Some students are likely to be deficient in prerequisite skills or harbor misconceptions. Armed with this diagnostic information, a teacher gains greater insight into *what to teach*, by knowing what skill gaps to address or by skipping material previously mastered; into *how to teach*, by using grouping options and initiating activities based on preferred learning styles and interests; and into *how to connect* the content to students’ interests and talents.”

(Jay McTighe and Ken O’Connor. 2005. Seven Practices for Effective Learning. *Educational Leadership*, vol. 63, no. 3 [November], p. 14.)

How?

- Achievement data
- Pre-assessment quizzes and probes
- Concept maps
- Drawings
- Analysis of activator and summarizer data

When?

- Before or early into a unit or lesson

Six Traits of Quality Pre-Assessments

1. Focused

Pick a reasonable sized topic to pre-assess. An entire unit is too large. You won't find many students who can demonstrate mastery of such a large topic. However, a single day's lesson is too small and will bury you in paperwork as you try to pre-assess on a daily basis.

Find a chunk of material that would take a week or two to cover. This will give you a chance to spread out testing as well as develop a decent-sized activity for those students who do demonstrate mastery. Plus, this chunk is small enough that several students can be expected to pass the pre-assessment. We don't want to discourage students by constantly announcing that no one passed.

As an example, for my 6th graders, a pre-test covering all decimal operations would be too large. This is an entire unit. The topic of "Adding Single-Digit Decimals" might be too small, since it's a one-day lesson and was covered in previous grades. However, I might give a pre-assessment covering all cases of "Adding and Subtracting Decimals." This is a "chapter sized" chunk and might take two weeks to go through following the textbook...

2. Quick!

By keeping your pre-assessment focused, you can make the testing procedure nice and quick—for you and your students. Students needn't take a forty-question unit test to show they can add decimals.

Can they demonstrate mastery with five questions? Ten questions?

By keeping it quick, you also alleviate the burden of grading and recording this paperwork.

Finally, this lowers students' frustration level. A giant test is intimidating and discourages effort. A quick, focused assessment encourages students to do their best, even if they can't always pass.

3. Comprehensive

On the other hand, make sure that your quick assessment adequately covers *all* aspects of your curriculum.

For example, to pre-assess addition and subtraction of decimals, I want to test the edge cases, not the low hanging fruit. Think of the errors that separate expert understanding from basic understanding, and test those.

Decimal Operations

If a student can answer these questions correctly, I know they have mastered these decimal operations at a 6th grade level:

1. $0.3 + 0.8 =$ _____
2. $1.7 + 0.45 =$ _____
3. $5.731 + 1.29 =$ _____
4. $3.0 - 1.25 =$ _____
5. $0.05 - 0.005 =$ _____



Notice that I don't waste any of my questions testing " $0.1 + 0.1$ ". I get straight to the meat that really demonstrates mastery.

In this case, I might also add a couple problem-solving questions as well, to make sure students can apply their understanding of decimals.

Punctuating Quotations

If I'm pre-assessing "punctuating quotations," here are five examples to punctuate that will separate the experts from the beginners:

1. I like candy said Joe
2. I said Joe like candy
3. Do you like candy asked Joe
4. Joe asked do you like candy
5. Do you Joe asked like candy

A final note on being comprehensive: *beware of multiple-choice questions*. It's too easy for students to "figure out" the right answer when it's right in front of them. And you don't want students guessing their way through your pre-assessment, either. Plus, you learn a lot about your students' understanding by seeing their work without any scaffolds.

4. Built On Existing Materials

I bet your curriculum came with all sorts of quizzes, extra-problems, test-prep, etc. that you rarely make use of. Dust off those ancillary materials and mine them for good questions. Don't reinvent the wheel.

5. Guiding

Your pre-assessment should do more than separate the class into two groups: mastery and non-mastery. It should also inform your lessons.

Maybe only three students successfully passed the pre-assessment. But did *everyone* get questions one and two right? This should change the way you teach that material. Move quicker, skip it, do a more creative activity, etc.

Likewise, did you notice some students miss those "easy" questions? Perhaps that will alert you to students in need of some extra help during instruction.

6. Sensitive

Your gifted kids like to score 100%. However, most students will not even pass a pre-assessment, especially when covering new or difficult material.

Prep your students for this. Explain *why* you offer the pre-assessment. Explain that a poor grade *never* enters the grade book...

Also, do not demand perfection. A student who achieves 90% shouldn't be forced to sit through all of your lessons. If a student misses one question, I'd include them on that specific lesson or give them a quick explanation when I show them their test.

Source: www.byrdseed.com/six-traits-of-quality-pre-assessments.



Example of an Academic Pre-Assessment: Vocabulary

Unit/Text_____ Name _____

Class _____

Directions: Place each vocabulary word in the box that indicates your level of understanding of that word.

Unknown words (I have never seen the word.)	Familiar words (I have seen it but am not sure of the meaning.)
Recognized words (I know this word.)	In-depth words (I can teach this word to someone.)



Example of an Academic Post-Assessment: Vocabulary

Unit/Text _____ Name _____
Class _____

Directions: Place each vocabulary word in the box that indicates your level of understanding of that word.

Unknown words (I have never seen the word.)	Familiar words (I have seen it but am not sure of the meaning.)
Recognized words (I know this word.)	In-depth words (I can teach this word to someone.)



Example of an Academic Pre-Assessment: Pre-Algebra

Pre-Algebra Lesson 6-1 Ratios and Rates

1. Write the ratio two servings to six cups as a fraction in simplest form.

- ☐ A. $\frac{1}{3}$ ☐ B. $\frac{1}{2}$
☐ C. $\frac{1}{6}$ ☐ D. $\frac{2}{3}$

Hint:

2. Use ratios to convert 65 miles per hour to feet per second.

- ☐ A. 57.2 feet per second ☐ B. 44.32 feet per second
☐ C. 343.2 feet per second ☐ D. 95.3 feet per second

Hint:

3. Express the ratio 45 seconds to 30 minutes as a fraction in simplest form.

- ☐ A. $\frac{3}{2}$ ☐ B. $\frac{1}{40}$
☐ C. 40 ☐ D. $\frac{2}{3}$

Hint:

4. Express the ratio 16 days to 4 weeks as a fraction in simplest form.

- ☐ A. $\frac{4}{7}$ ☐ B. $\frac{8}{15}$
☐ C. 4 ☐ D. $\frac{16}{31}$

Hint:

5. A six-pack of soda costs \$2.29, a 12-pack of soda costs \$3.99, and a 24-pack of soda costs \$5.49. Which pack has the lowest cost per unit?

- ☐ A. The unit rates are equal ☐ B. 24-pack
☐ C. 12-pack ☐ D. 6-pack

Hint:



Example of an Academic Post-Assessment: Pre-Algebra

Pre-Algebra

Lesson 6-1

Ratios and Rates

1. Write the ratio two servings to six cups as a fraction in simplest form.

- ☐ A. $\frac{1}{3}$ ☐ B. $\frac{1}{2}$
☐ C. $\frac{1}{6}$ ☐ D. $\frac{2}{3}$

Hint:

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- ☐ A. 57.2 feet per second ☐ B. 44.32 feet per second
☐ C. 343.2 feet per second ☐ D. 95.3 feet per second

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Hint:

5. A six-pack of soda costs \$2.29, a 12-pack of soda costs \$3.99, and a 24-pack of soda costs \$5.49. Which pack has the lowest cost per unit?

- ☐ A. The unit rates are equal ☐ B. 24-pack
☐ C. 12-pack ☐ D. 6-pack

Hint:



Example of an Academic Pre-Assessment: Writing

For my pre-assessment tool, I used a writing prompt, found below, and assessed it on the 6 Traits of Writing, which are focused on throughout the year. The 6 Traits of Writing are: Sentence Fluency, Ideas and Content, Organization, Voice, Word Choice, and Conventions.

The following is the writing prompt:

Directions: Select one of the following two questions to answer. Fill in the bubble on your answer sheet for the question you selected (#1 or #2). Answer the question on the front and back of the answer sheet. You may use a separate sheet of paper to make an outline or first draft. Your final draft goes on the answer sheet.

Question 1: All of us face challenges in life. One challenge might be making new friends. Another challenge might be learning how to play a sport or a musical instrument. In a well-developed composition, describe a challenge that you or someone you know has faced. What lesson did you learn? Support your ideas with examples and details.

Question 2: Pretend your class is putting together a time capsule that will not be opened by anyone for 100 years or more. This time capsule will tell people in the future what life on earth was like today. You can choose one thing to go inside. In a well-developed composition, explain what you will choose and provide your reader with at least three reasons why you chose this one thing to go into the time capsule.

Source: Ani Barsoumian, Curley Middle School, Boston, MA. Used with permission.



Activators

Structures for Activating Students' Knowledge Prior to Teaching New Material

*“Substantial research has validated the important role prior knowledge plays in students’ academic success. * In fact, research has identified “red flag” approaches to teaching that undermine student motivation and learning. These include foregoing connecting new material to students’ prior knowledge. ** Such connections are important because students confront new information every day. They must integrate the new material into their existing knowledge, construct new understandings, and revise current beliefs or theories as needed. Students who lack adequate prior knowledge or are not able to activate what they know often struggle to progress in a subject area or school itself... There are two primary classroom approaches to working with prior knowledge. The first includes tapping or activating preexisting knowledge. The second approach is that of building or developing new background knowledge.”*

* Educational Research Service, 2006; Marzano, Gaddy, & Dean, 2000; Smith, Lee, & Newmann, 2001

** Dolezal, Welsh, Pressley, & Vincent, 2003.

Source: Linda M. Campbell and Bruce Campbell. 2009. *Mindful Learning: 101 Proven Strategies for Student and Teacher Success*, 2nd ed. Thousand Oaks, CA: Corwin, p. 9.

Questions to consider when selecting an activator:

- What is my purpose for using this activator?
 - To preview upcoming information
 - To pique student interest and create mental engagement
 - To gather data about what students already know
 - To surface misconceptions
 - To build confidence: “I already know something...”
 - To adapt lesson plans to match students’ background knowledge
- What is most important about the content, skill, or strategy we’re about to study?
- What data do I have already about students’ understanding of this content and their level of interest in this content?
- What more data do I need?

The following activators are described in detail on the pages that follow:

- | | |
|--|--|
| 1. Anticipation Reaction Guide | 12. Know, Want to Know, Learned (KWL) |
| 2. Brainstorm and Categorize | 13. Line-ups: Values, Estimation, Experience |
| 3. Brainstorm Flexibility Style and Web | 14. Medium-Size Circle |
| 4. Carousel Brainstorming | 15. Mental Imagery |
| 5. Draw a Picture/Diagram | 16. Sorting Cards or Pictures |
| 6. The Envelope, Please | 17. Stand and Share |
| 7. Gallery Walk/Walking Tour | 18. That’s Me |
| 8. Getting Organized Graphically | 19. Think-Puzzle-Explore |
| 9. Give One, Get One, Move On | 20. Three-Two-One Bridge (3-2-1 Bridge) |
| 10. Given a Skeleton/ Outline, Fill in the Details | 21. Word or Picture Splash |
| 11. Human Treasure Hunt | 22. Write Five Words... |

(cont. next page)



Activators

*The important thing about **activating student knowledge prior to presenting new material** is that it helps students prepare for new learning and it can provide the teacher with some formative data to guide lesson planning. All activators require students to generate information or respond to prompts that will be used to create connections between what they currently know and what they will be learning. Some activators ask students to fill blank pages with prior knowledge related to a topic. Others give students data to organize, react to, or work with in some way. Choosing the right activator depends a lot on how much prior knowledge students are likely to have: if the topic is one they are likely to have studied previously or encountered in other venues, blank page formats might best match because they invite a lot of data and often surface misconceptions. But if the topic is relatively unfamiliar, formats that give students data to work with and react to are likely to better serve the purpose of creating curiosity and engagement in the topic. Depending on how an activator is structured (written or verbal; individual, small group, or large group responding) it might serve as a pre-assessment tool as well as an activator. All pre-assessments are activators but not all activators are reliable pre-assessments. And many of these formats can also be used to have students summarize what they have learned during or following instruction. But the important thing about **activating student knowledge prior to presenting new material** is that it helps students prepare for new learning and it can provide the teacher with some formative data to guide lesson planning.*

1. **Anticipation Reaction Guide:** Students are given a series of true-false (or agree-disagree) statements related to the topic and are asked to take a stand on each (mark them “T” or “F,” “A” or “D”) based on anything they know or values they hold. The idea is to get students to place their stake in the ground and then to revisit and verify or modify their choices as the learning begins. As an introduction to photosynthesis in tenth grade, Paul Frisch (Bedford, NY) has students respond to 15 true-false statements such as: “Photosynthesis is only performed by plants”; “Algae are the organisms that perform the most photosynthesis on earth”; “Photosynthesis converts light energy into chemical energy.” Some of the statements surface common misconceptions. Others contain basic knowledge that most students will have a chance of responding to accurately; still others go beyond what most students will know anything about. So in the process of responding there is a chance for all to realize that they already know something, a chance that all will see there is lots more to know about photosynthesis, and a chance for the teacher to identify misconceptions that students have about this topic. These misconceptions can then be addressed head-on during upcoming instruction.
2. **Brainstorm and Categorize:** Students generate things they know or associate with a topic and sort them into groups or categories. Sorting into and labeling categories often serves as a trigger for generating more ideas within a category. Brainstorming on Post-it notes or small pieces of paper makes the sorting task much easier. A display of students’ ideas can serve as a visual referent for confirmation, editing, and making additions to their initial knowledge.
3. **Brainstorm Flexibility Style and Web:** Ideas for this format are collected on a T chart labeled “idea/category.” Students brainstorm things they know about—or associate with—a topic and each time a student offers an idea s/he also names a category. As students add more ideas they try to add ideas in categories not already named. Once the initial brainstorming is over the T chart can be converted to a web, with the topic in the center and categories as branches. Categories and ideas can be added to the web throughout the unit of study.



4. **Carousel Brainstorming:** This format works when the topic being introduced has some degree of familiarity for students and where the topic can be divided into subtopics or a series of questions for students to think about. Large sheets of chart paper are posted at stations around the room (on the wall or on tables or desks). Each chart is labeled with a different question or subcategory to be previewed. Students are assigned to small groups (four to five students per group). Each group is assigned to a different chart and given a colored marker that will serve as their identity throughout the activity (the “red group,” the “blue group,” etc.). When the signal is given, students start brainstorming responses to the question or topic on their chart. After about two minutes, and at an established signal, groups (1) rotate sequentially to the next chart, keeping their marker but switching recorders; (2) read what has been written by the previous group(s); and (3) add more of their own ideas without duplicating what has already been stated. Continue this way until each group has visited and added to all of the charts. An optional last step is to have groups move back to the chart they started and (1) see what developed after they left it; (2) identify any ideas that need to be explained; and (3) group the ideas into categories if relevant or useful. A sixth-grade mathematics teacher used this format to find out what students knew about equivalent fractions. A fraction was posted at the top of each chart and students generated many and different equivalent fractions. English teacher Diane Sarna (Bedford, NY) used this to introduce *Romeo and Juliet*: students brainstormed what they knew about Renaissance England, Shakespeare, the play itself, etc. Not only did it give students an opportunity to talk together about what they knew or thought to be true, it gave Diane a lot of information to reference as she began working with students on the play. One interesting misconception it surfaced was that students had confused the Middle Ages and the Renaissance.
5. **Draw a Picture/Diagram:** One way to activate knowledge and to assess and measure learning is to ask students to draw “before and after” diagrams (Karen Reynolds, San Jose State University). Introducing a unit on electricity, a fourth-grade teacher asks students to draw a picture of a room in their house where they frequently turn a light off and on using a wall switch. In the picture they are asked to sketch the locations of the switch and the light and to explain how the two are connected to each other. To determine what kind of prior knowledge students bring to the topic, the teacher will have students explain their drawings. As an introduction to an astronomy course, students are asked to “show how the relative positions of the Earth, Sun and Moon produce the phases of the Moon, the Moon’s path around the Earth, and the Moon’s path around the Sun.” As they progress through the unit of study, students revisit their diagrams to compare what they had drawn to what they know now. In a mathematics class students are asked to read nonroutine word problems and represent the situation in a sketch. Students share their sketches prior to representing the problems numerically. This enables the teacher to assess what students do and don’t understand about the problem they have read before they try to solve it.
6. **The Envelope, Please:** As students enter the classroom the teacher hands each a sealed envelope containing a question they will be held responsible for at the end of the class period. On a separate handout, students get a list of all the questions that could appear in their envelope. They are given a few minutes prior to the beginning of class to preview all of the questions that frame what is important to focus on during instruction. Five or 10 minutes before class ends students open their envelopes and rehearse their responses. Then the teacher randomly (or systematically) calls on individual students (asking for “the envelope, please”), reads the question for the whole group, and has that student supply the answer. Thus, this serves as both an activating and a summarizing format.



7. **Gallery Walk/Walking Tour:** Modeled after the idea of a museum tour, this activator serves as a way to build background knowledge when students are likely to have minimal experience with a concept or topic. The teacher creates a series of exhibits related to the topic. In small groups and guided by a series of questions, students visit the exhibits to gather information about the topic. As an opening to the study of animal classification, for example, a teacher has set up exhibits containing pictures of reptiles, amphibians, mammals, etc. in their natural habitats. As students visit each exhibit they search for what the animals in that exhibit have in common. Following a discussion of what they have noticed, the teacher introduces the notion of classification based on common attributes.

8. **Getting Organized Graphically:** Teachers provide students with a particular graphic organizer to prompt a specific kind of thinking and the relationships associated with that type of thinking. Students are then given a topic or concept to consider and the graphic organizer is used to capture their initial thinking. As students progress through the unit, they add new information and relationships to their organizers.

In an American government course, students are given a “Proposition” graphic organizer and asked to use what they read in the previous night’s article to generate three arguments in support of the proposition that “A democratic form of government is not necessarily ‘of the people, by the people, and for the people.’” Their ideas will be the basis for the discussion in that day’s class. In a second-grade class three fish in the aquarium have died overnight. To tie this in to an overall big idea (Interaction and Interdependence of Living Things) that they have been exploring in science, the teacher draws a cause-effect graphic organizer on the board and asks students to brainstorm possible causes. Once they have done so they shift to thinking about what changes might occur in the aquarium as a result of this event. This is followed by research to investigate their hunches about causality and careful observations to collect data regarding possible effects. More detailed information about graphic organizers can be found on notebook pages 249-254.

9. **Give One, Get One, Move On:** As an activator, this “swap shop”-like format is a quick and energizing way to help students preview a topic, prepare for a lecture/presentation, or get ready to participate in a discussion. A sheet of paper is divided into a given number of boxes (e.g., three across and three down, or nine boxes total). Students are instructed to individually fill in two or three of the boxes with ideas they associate with the topic, important ideas they got from the previous night’s assigned reading, or examples of something related to the topic coming up in class. Once students have prepared their own set of ideas, they get out of their seats, walk up to someone, and give an idea away and get a new one to add to their papers. Once ideas are exchanged students move on to another partner, continuing to collect more ideas until time is called or all of their spaces are filled. A fourth-grade teacher asks students to list all the different ways they could make change for a dollar using pennies, nickels, dimes, and quarters. This is the introduction to making change with the fewest number of coins. In an introductory Spanish class, students are asked to write in English words or phrases they might need to be able to order in a restaurant. During the lesson they fill in all the words and phrases introduced that match something on their “Give One, Get One” sheet. Finally, students identify words or phrases they need from the teacher in order to label all of their entries.



10. **Given a Skeleton/Outline, Fill in the Details:** Somewhat similar to Draw a Picture/Diagram (above), this format asks students to fill in (and possibly label) as many details as they can when they are given a visual outline of something to be studied. Prior to studying systems of the human body, for example, students are given an outline of the body and fill in anatomical parts and body systems that they know and as they imagine them to look. Given a map of the United States, students are asked to label as many states as they think they know.
11. **Human Treasure Hunt:** Based on the premise that experiential knowledge and resources abound among the students in the class, the teacher designs a series of questions or prompts related to the topic or concept to be introduced and using the lead-in “Find someone who....” Prompts are written into eight to 12 (or more) squares on a page. Students preview the prompts to determine which ones are true about them and prepare to be “human treasure” for their peers when the “treasure hunt” begins. Everyone gets up out of their seats seeking peers who can sign different squares because of their prior knowledge or experiences. In the process all learn something about the upcoming topic and about one another. Previewing a unit on first aid in a health class, students have to try to “find someone who: knows a certified EMT, has worked in a hospital or clinic, knows his/her blood type,” etc.
12. **Know, Want to Know, Learned (KWL):** Sometimes referred to as the “three-column activator” because of its many variants, this is an activator one might use to preview a topic that students have assuredly had some experience with previously. Given a topic and a blank sheet of paper, students brainstorm and record in two columns “What I Know” and “What I Want to Know” about this topic. The third column in this particular version—“What I’ve Learned” (hence KWL) is reserved for students to track their new learning once the study is underway. Students can take greater ownership for their learning when they are provided planned reflections throughout the study to monitor and represent their evolving known and unknown knowledge, even physically manipulating post-its, sentence strips, index cards from one column to the other or electronically modifying the content in the columns.

As an example, a high school teacher discovered through pre-assessment data that students have seen a lot of courtrooms on TV (real and fictional; ordinary and sensationalized). She previews the unit on Trial by Jury using a KWL chart related to the topic.

Some variants of this strategy include:

The Known and The Unknown

Things I Know, Think I Know, Want to Know (KTW)

KWL + What Else I Want to Learn, How I Use What I Know

13. **Line-ups: Values, Estimation, Experience:** This format is designed to get students thinking about the upcoming topic in class by responding (with a numeric value) to a prompt related to the topic. In a values line-up students are asked to “take a stand” in response to a prompt and to line up sequentially according to their response. Prior to reading Barbara Clooney’s *Miss Rumphius*, third-grade students are asked to agree or disagree (on a scale of 1 to 4) with statements like: “If you have a lot of money, you will be happy” or “Older people can’t do anything to help others because they need help themselves.” Taking the statements one at a time, students record their responses (1-4) on Post-it notes and then line up sequentially from lowest to highest. Once the line-up is formed, students might be asked to share with the person beside them the reason for their “stand.” The



line-up can also be split in the middle, with one half of the line sliding in front of the other half so students can hear from peers with viewpoints different from theirs. After reading the book students might respond to the same prompts to explore whether or not their opinions have changed and why. In an estimation line-up students might respond to prompts like “Estimate the number of bones you have in your entire body” as a preview to studying the skeletal system; or “Estimate the number of people who are dying daily in this country of heart-related diseases” to open a presentation on cardiovascular exercise in a health class. This time students would be sharing with one another the basis for their estimates.

In an experience line-up students respond to prompts by assessing the degree to which they are familiar with—or confident in their knowledge about—an upcoming topic. In an art class, a teacher asks students to decide “How comfortable and confident are you with the process of measuring angles with protractors? Rate yourselves on a scale of 1 to 4 so I can put together groups where you can help each other master this before we move into geometric design projects.” When students have positioned themselves in line, the line can “divide and slide” so the upper half of the line now faces a partner who is in the lower half of the line. Dividing and sliding the line of pairs will then create heterogeneous groups for practice of the skill. The same could be done for reviewing a topic or content that serves as the foundation for new material: the line is used to form heterogeneous groups for some sort of peer teaching activity. The line could also be used to form homogeneous groups if a task is to be differentiated based on students’ prior knowledge.

14. **Medium-Size Circle:** This format has students seated in a circle (or half in a circle and half standing behind those who are seated) and begins with a prompt for students to respond to voluntarily as they are ready to do so. The intent is to create a nonthreatening opportunity for students to share their thoughts, opinions, recollections, or knowledge about a topic, concept, or issue and to surface that information as a backdrop for instruction. For example, as an opening activity before discussing the DVD they viewed in class the previous day, students sit in the circle and respond to the prompt: “One thing that really struck me in what we saw was....” Typically a Medium-Size Circle includes three rounds: the first half of each round involves five to seven students sharing thoughts; the second half involves these students remembering who spoke and what they had to say. This is not a dialogue format: students don’t react to/agree or disagree with one another’s thoughts; they merely listen and add their own thoughts. Thus, this format also serves as an opportunity for students to practice listening and attending nonjudgmentally to the ideas and opinions of others. More detailed directions for this format are provided in a separate handout elsewhere in this binder.
15. **Mental Imagery:** When used to activate prior knowledge, students are asked to close their eyes and construct images related to a topic or concept. Depending upon the degree of presumed prior knowledge, the teacher might simply describe a situation or location that all students have had considerable experience with and ask them to “close your eyes and picture everything you might see there,” or the teacher might use a detailed imagery script to introduce and develop “experience” with a situation or a setting. In the former situation a teacher who is introducing a unit on oceanography to a group of students who have grown up near the beach might ask them to close their eyes and “picture everything you might see if you had a glass-bottom boat and could see deep into the ocean water.” In the latter instance the teacher might ask his/her students to close their eyes and, with music playing in the background to simulate sounds of the ocean, guide them

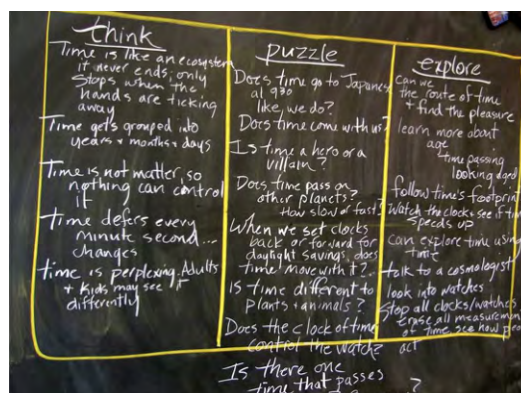


through a tour on a glass-bottom boat, describing in great detail ocean scenes and creatures they might encounter along the way. Note that mental imagery can also be used for clarity purposes, such as understanding physical states, events, or processes, setting a mood or scene, or as analogies for concepts. It can also serve as a mnemonic aid, to improve physical performance, and for self-motivation. More detailed guidelines for developing imagery experiences and an example can be found on notebook page 239.

16. **Sorting Cards or Pictures:** With this activator students are given a set of cards containing information related to an upcoming topic and asked to sort them in some way. The intent is to get students actively engaged with and immersed in data related to the topic and to get them talking among themselves in a way that they can recollect and share knowledge and experience. Middle school science teacher Jane Langke (Bedford, NY) introduces cell division by giving students five cards (each a different color) containing sketches of different stages of cell division. Students are asked to sort the cards into the sequence in which they think cell division takes place given what they see in the pictures. She can tell at a glance based on the color sequence how accurate they are, and this lays the foundation for focusing their attention during her lecture on cell division. In a mathematics class students are given cards containing pictures, definitions, and properties of quadrilaterals and asked to find the matching cards. The challenge for those who finish early is to sort the groups into hierarchical order based on their properties.
17. **Stand and Share:** This activity is a form of brainstorming that incorporates movement. The teacher asks a question that has several answers— e.g., who are modern day heroes?— and gives students a chance to think about/write down some answers. The teacher directs the students to stand and asks one student to volunteer an answer. The teacher writes the answer on the board and says that if that is the only answer students have, they are to sit down. If they have other answers, they should remain standing. The teacher continues to write down answers until everyone is seated.
18. **That’s Me:** This is a format one might use to collect data about students’ background knowledge and experiences and/or to have students recognize how their lived experiences connect them to upcoming learning experiences. The teacher makes a series of statements. For each statement that is true for students they stand and declare, “That’s me.” A health teacher begins a class on first aid by making statements such as, “I have broken a bone in my body and worn a cast”; “I have known someone who had a heart attack or a stroke”; “I know what to do if someone passes out in my presence”; “I can explain what the Heimlich maneuver is.” This serves as the introduction to the kinds of things students will be learning about in the unit. As an introduction to *Catcher in the Rye*, Diane Sarna (Bedford, NY) has her students stand in a circle and respond to a series of questions by taking a “step forward each time the answer to one of these questions is ‘yes’ for you.” Questions address the types of experiences students might have had that will help them relate to the main character in the novel: “Have you ever done someone else’s homework for them?” “Have you ever felt a parent or guardian didn’t understand you?” etc. She ends the activity saying to students, “When we open the pages of our next novel I think you will find that you and the main character share a lot in common and have faced some very similar challenges.”
19. **Think-Puzzle-Explore:**
 - What do you think you know about this topic?
 - What questions or puzzles do you have about this topic?
 - How can you explore this topic?



This is a thinking routine designed to help students connect to prior knowledge, to stimulate their curiosity, and to lay the groundwork for independent inquiry. Teachers engage students in this routine by prompting them to consider what they already know and wonder about a given topic, then to brainstorm ideas in all three areas (Think, Puzzle, Explore). Depending on students' familiarity with this routine, the teacher may have students consider the *Think* and *Puzzle* questions and report their thinking before moving into the *Explore* questions. Ensure students have adequate time between each question to think about and articulate their ideas. It's typical for students to have simplistic ideas and misconceptions about a topic at this point, so include them and push their thinking to include ideas that are truly puzzling and interesting to them. Maintain a visual of students' thinking.



An example from a 5th grade study of Time found at: <https://www.facebook.com/photo.php?fbid=679487955436196&set=a.243661132352216.73810.232080106843652&type=1&theater>

20. **Three-Two-One Bridge (3-2-1 Bridge):** A thinking routine, 3-2-1 Bridge asks students to uncover their initial thoughts, ideas, questions, and understandings about a topic and then to connect these to new thinking about the topic after they have received some instruction. Whenever new information is acquired, bridges can be built between new ideas and prior understanding. The focus is on understanding and connecting one's thinking, rather than pushing it toward a specific outcome. After the experience, students might be given the opportunity to revise their original 3-2-1 Bridge, or to complete a new one, explaining shifts in their thinking.

The following is an example used from a 10th grade Physical Education class.

Initial Response

What are 3 WORDS that you connect to fitness? lifestyle, healthy, sport

What 2 QUESTIONS regarding fitness are you pondering? Does fitness help keep a constant weight? Does fitness help you live longer?

be able to do anything you want with your body.

Synthesizing of New Information At first I thought that fitness was just having a fit body, being slim and having strong muscles. Now though, I realize that fitness isn't all about the physical aspect, but also about the mental aspect as it takes dedication and perseverance to keep doing activities. Leading a healthy lifestyle means being comfortable with body image, having a healthy diet and keeping up with a regular fitness routine. Fitness is the condition of being fit and healthy. Creating a routine that is simple yet pushes you can help you maintain it for the rest of your life. Once you have established this program and you get used to it, it gets easier to follow it. My responsibility now is to keep following the training program and to keep a realistic view of what I can do and will be able to do thanks to the program. Another thing I've learned through doing the workout in class, is that

(cont. next page)



doing it with friends helps me stay motivated as it makes it more fun. In order to reach my fitness goals I need to push myself every week, to keep doing the exercises and to keep improving once they get easier. Keeping fit means constantly pushing your body to improve, but at the same time knowing your limits. Also, since I noticed doing it with other people helps, I should try to find friends and try to establish a time when we can meet and work out together.

New Responses

What are 3 WORDS that you connect to fitness? exercise, routine, body image

What are 2 QUESTIONS regarding fitness are you pondering? Should the amount of working out you do change as you grow older? How important is diet if you work out regularly?

Write a METAPHOR or SIMILE describing fitness. Fitness is balance in your life.

BRIDGE – complete the sentence starter: I used to think fitness was ... , but now I think fitness is I used to think fitness was just exercise and being slim and muscled, but now I think fitness is knowing your body and its limits and knowing how to work it to improve its skills.

Found at <https://www.facebook.com/MakingThinkingVisible>;
<http://clairearcenas.wordpress.com/2014/04/02/fitness-for-life-so-what-about-it-2/>

21. **Word or Picture Splash:** A Word Splash is a format designed by Dorsey Hammond (Oakland University, Rochester, MI) to preview a reading assignment and to support comprehension of a nonfiction text. Key terms selected from a reading, a chapter in a textbook, an article, etc. are presented to students in a visual display with the topic or main idea in the center. Working independently, in small groups, or as a whole class, students speculate about how individual terms might be associated with the topic in the center and develop at least one statement about each term as it might relate to the topic. Once statements have been generated, students turn to the printed material to read and check their ideas for accuracy and to revise them where necessary. Teachers have also used this format as a preview to a lecture or a video. Where relevant, pictures or objects can be used in place of words to create a “Picture Splash” or an “Object Exhibit.” Students create associations between pictures and/or objects and the upcoming topic of study. See an example of a Word Splash on notebook page 24.
22. **Write Five Words...:** Given a topic or a picture related to the topic, students are asked to “Write five words you think of when you look at this picture (or when you think about this topic).” Students might be asked to share their responses and their reasons for the responses in small or large groups. This is used to kick off the introduction to the topic, which includes the teacher’s reason for selecting that word or visual.

For more information, see Jon Saphier and Mary Ann Haley. 1993. *Activators: Activity Structures to Engage Students’ Thinking Before Instruction*. Acton, MA: Research for Better Teaching.



Activator Choices

Activator Choice	Reason For Use	Ideas for Use



Consolidating and Anchoring the Learning

Eight-Two (8-2): Developed originally by Dr. Mary Budd Rowe (University of Florida), 8-2 is a time guideline for balancing input of new information with opportunity for students to process what they have been listening to, reading, or viewing. In the following excerpt Dr. Rowe reports on the benefits that her research showed for this approach:

Often in high school, and particularly in college, there is a need to convey complex content, and the lecture appears to be the most commonly chosen format. For the lecture situation, I developed a ten-two procedure for college and the eight-two for high school. Based on a theory about how short-term and long-term memory interact, I identified four types of mental lapses that take place on the part of listeners in science classes (Rowe, 1967a, 1980, 1983). Using the ten-two and eight-two formats, participating science faculty would lecture for eight to ten minutes then stop for two. In the strictly regulated two-minute intervals, students in sets of three shared their notes and helped each other clarify concepts. All unresolved questions were to be reserved for the last five minutes of the period. Experimental groups following this regimen generally show improved performance over control groups on the more complex test items, more delayed retention, and more positive attitudes toward the subject and method. The quality of student questions also improves as does the usefulness of their notes.

(Mary Budd Rowe. 1987. Wait Time: Slowing Down May Be a Way of Speeding Up. *American Educator*, vol. 11 [Spring], pp. 38-43. Reprinted with permission from *American Educator*, the quarterly journal of the American Federation of Teachers, AFL-CIO)

While Dr. Rowe's research was conducted based on lectures, we believe the same principle applies any time learners are taking in new and complex information: viewing a film, listening to a discussion, reading text, etc. In all instances the implication is that more is retained and understood when students have intermittent opportunities to reconstruct what they have been absorbing.

Questions to consider when selecting a summarizer:

- What is my purpose for using this summarizer?
 - To check for understanding
 - To surface confusion or misconceptions
 - To deepen understanding
 - To support retention
 - To gather formative assessment data
 - To adapt lesson plans to match students' background knowledge
- What is most important about the content, skill, or strategy we studied *today*?
- What *more* data do I need about students' understanding of this content?

(cont. next page)



Summarizers

Structures for Getting Students to Summarize During and Concluding Instruction

The following summarizers are described in detail on the pages that follow:

- | | |
|---------------------------------------|---|
| 1. A-B-C Summarizer | 19. Luck of the Draw |
| 2. Best Test | 20. Medium-Size Circle |
| 3. Biopoems | 21. Memory Jogger Review |
| 4. Board Games or Game Shows | 22. Numbered Heads |
| 5. Carousel Brainstorming | 23. One-Question Quiz |
| 6. Color, Symbol, Image (CSI) | 24. One-Word Summary |
| 7. Connect-Extend-Challenge | 25. Paired Verbal Fluency |
| 8. Draw a Picture/Diagram | 26. Prep Notes |
| 9. The Envelope, Please | 27. Reciprocal Teaching |
| 10. Give One, Get One, Move On | 28. Relay Summary |
| 11. Graphic Organizers | 29. Sorting Cards or Pictures |
| 12. Headline News | 30. "Summary Sam" |
| 13. (The) Important Thing About... | 31. Synectics Review |
| 14. Inside-Outside Circle | 32. Thinking Logs |
| 15. I Used to Think...But Now I Think | 33. Think-Pair-Share |
| 16. Last Word | 34. Three-Two-One Bridge (3-2-1 Bridge) |
| 17. Learning Buddies | 35. Ticket to Leave |
| 18. Learning Logs | 36. Write a Rap |

*The important thing about **summarizing by students** is that it supports understanding and retention and it can provide valuable formative assessment data for the teacher. It might be a closing activity at the end of a class or the opening activity for the next class. Or it might be scheduled intermittently during a class when there is a lot of information being presented to students. There are a variety of ways one can structure the summarization. It can be done in two-minute formats (Paired Verbal Fluency) or it can be much longer (Medium-Size Circle). It can involve speaking, writing, or drawing on the part of the student. But the important thing about **summarizing by students** is that it supports understanding and retention and it can provide valuable formative assessment data for the teacher.*

1. **A-B-C Summarizer:** Each student (or small group of students) is given a letter of the alphabet and is asked to construct one word or phrase related to the topic beginning with that letter. Students then share their ideas in the large group. Alternatively, students write their ideas on sentence strips and a chart is constructed for long-term reference.
2. **Best Test:** At the conclusion of a unit of study, students are paired or grouped to write what they consider to be the best test questions for that unit and to write out the answers for the questions they submit. They are given guidelines as to how many of each type of question to include (fill in the blank, essay, etc.). If a student's test is selected as the best, s/he receives an automatic "A" for that test and doesn't have to take the test itself. *Variation:* If any of a student's questions appear on the actual test, s/he receives bonus points. (Idea from Tom Gwin, Winchester, MA.)



3. **Biopoems:** This is a poetic format designed for students to reflect on and synthesize what they have learned about a person, place, thing, concept, or event. A standard pattern, along with an example, follows here, though the pattern might be modified to better suit the topic being summarized.

Line 1. First name

Line 2. Four traits that describe character

Line 3. Relative (brother, sister, daughter, etc.) of _____

Line 4. Lover of _____ (list three things or people)

Line 5. Who feels _____ (three items)

Line 6. Who needs _____ (three items)

Line 7. Who fears _____ (three items)

Line 8. Who gives _____ (three items)

Line 9. Who would like to see _____ (three items)

Line 10. Resident of _____

Line 11. Last name

JOHNNY

Joyous, crippled braggart, stuck on himself;

Foster child of Mr. & Mrs. Lapham

Lover of silver, Cila, and spying;

Who feels harsh, sensitive and wanting to help people;

Who needs to be loved, recognized, and treated fairly;

Who fears Rab leaving, the war going on, Paul Revere getting through the gates. Who gives Rab a gun, clothes to Pumpkin, and love to Cila;

Who would like to see the war end, Rab live, and Pumpkin get his farm.

Resident of Boston.

TREMAIN

4. **Board Games or Game Shows:** Using information relevant to the topic they've studied, students design board games or game shows modeled after some of their favorites. The format should be matched to the type of information they are required to summarize: Jeopardy or Trivial Pursuit might be a match for fact-based information; Monopoly might be a match for demonstrating more conceptual understanding. For example, students in an environmental science class have to decide what would be the environmental goal equivalent to amassing property of different values in Monopoly. Cards and places to land on the board would be designed accordingly. To keep the focus on meaningful content, it is important to establish with students ahead of time the conceptual understandings they must demonstrate or integrate as they design their game. For students sophisticated with the use of appropriate software, designing an online game is an alternative.
5. **Carousel Brainstorming:** This format works when the topic being studied can be divided into subtopics. Large sheets of chart paper are posted at stations around the room (on the wall or on tables or desks). Each chart is labeled with a different question or subcategory to be reviewed or

summarized. Students are assigned to small groups (four to five students per group). Each group is assigned to a different chart and given a colored marker that will serve as their identity throughout the activity (the “red group,” the “blue group,” etc.). When the signal is given students start brainstorming responses to the question or topic on their chart. After about two minutes, and at an established signal, groups (1) rotate sequentially to the next chart, keeping their marker but switching recorders; (2) read what has been written by the previous group(s); and (3) add more of their own ideas without duplicating what has already been stated. Continue this way until each group has visited and added to all of the charts. An optional last step is to have groups move back to the chart they started and (1) see what developed after they left it; (2) identify any ideas that need to be explained; and (3) group the ideas into categories if relevant or useful. One ninth-grade English teacher used this format to have students review details of short stories studied during the semester in preparation for the final exam. Each story was posted on one chart and students generated everything they remembered about the short story (characters, setting, plot, theme, stylistic elements, etc.). The charts remained on the wall during the mid-term exam for student reference as they responded to essay questions. As a review activity, another teacher had subtopics that would be the focus of the mid-term on each chart; students brainstormed questions related to that topic that might be on the test and worked in small groups to generate answers to their questions.

6. **Color, Symbol, Image (CSI):** This Visible Thinking routine was developed by Project Zero as a way to teach students how to capture the essence of a concept through the use of metaphor and visual illustrations. Students are prompted to take notes while experimenting, observing, listening, and reading, and then to select three of the ideas that represent the most key points. On a separate piece of paper divided into three columns, students label the columns: “Color,” “Symbol,” and “Image.” In each corresponding column, students illustrate a color, symbol or image that best represents or captures the essence of the idea. With others, students then explain why they chose the images they did, and provide justification from the experiment, artifacts, reading, etc.



(From a 6th grade classroom; posted on: <https://www.facebook.com/MakingThinkingVisible>)

7. **Connect-Extend-Challenge:** This processing routine prompts students to make connections between, ask questions about, and synthesize pieces of new learning. It does take repeated practice for students to develop efficiency in using this routine, and requires explicit and frequent modeling about what makes a connection a meaningful one, what kind of extensions grow our thinking, and

what challenges are worthy of our time and effective efforts. Students are prompted to consider what they have just read, seen, or heard following an information-rich experience, and then to ask themselves:

- How are the ideas presented **connected** to what you already knew?
- What new ideas did you get that **extended** or broadened your thinking in new directions?
- What **challenges** or puzzles have come to mind from the ideas and information presented?

8. **Draw a Picture/Diagram:** As an alternative to a verbal summary students are asked to draw a representation of something studied in class or to process their verbal notes by drawing diagrams or sketches that could capture the essence of an idea and be “worth a thousand words.”
9. **The Envelope, Please:** As students enter the classroom the teacher hands each a sealed envelope containing a question they will be held responsible for at the end of the class period. On a separate handout, students get a list of all the questions that could appear in their envelope. They are given a few minutes prior to the beginning of class to preview all of the questions that frame what is important to focus on during instruction. Five or 10 minutes before class ends students open their envelopes and rehearse their responses. Then the teacher randomly (or systematically) calls on individual students (asking for “the envelope, please”), reads the question for the whole group, and has that student supply the answer. Thus, this serves as both an activating and a summarizing format.
10. **Give One, Get One, Move On:** As a summarizer, this “swap shop”-like format is a quick and energizing way to help students review a topic, process information, or summarize what they have learned with help from others. A sheet of paper is divided into a given number of boxes (e.g., three across and three down, or nine boxes total). Students are instructed to individually fill in two or three of the boxes with ideas they want to remember about, key points about, or examples and applications of a concept studied in class. Once students have prepared their own set of ideas they get out of their seats, walk up to someone, and give an idea away and get a new one to add to their papers. Once ideas are exchanged students move on to another partner, continuing to collect more ideas until time is called or all of their spaces are filled.
11. **Graphic Organizers:** Using the definition of graphic organizers as diagrams that show thinking relationships between ideas, a teacher selects a particular organizer to match the type of thinking relationship s/he wants students to represent in the summary activity. Following a reading that describes the similarities and differences between a plant and an animal cell, students are given a “compare-contrast” graphic organizer to complete as a summary. For homework students are required to preview the lab for the next day and fill in a “sequence” graphic organizer summarizing the steps they will follow to complete the lab. Third-graders watch a film about erosion and when the teacher periodically pauses the film, students fill in a “cause-effect” graphic organizer with what they have learned up to that point about what causes erosion and why it is a concern (effects). More detailed information about graphic organizers is included in separate handouts elsewhere in this notebook.



12. **Headline News:** A close relative of “Summary Sam” (below) but designed for older students, this verbal format introduces a prop to keep students interested. Asking students to “summarize things you learned during class today,” the teacher hands a microphone to the first volunteer. After speaking into it, the student passes it off to a peer to share another idea, and it gets passed around as students collectively summarize key ideas learned in class.

13. **(The) Important Thing About...:** Using the pattern from Margaret Wise Brown’s *The Important Book*, students create a paragraph-length summary about a topic they have studied. The first and last sentences contain the same idea; the center includes related and/or supporting details.

The important thing about a variable is it always takes the place of a number.

A variable always hides an unknown number.

A variable is always a letter.

But the important thing about a variable is it always takes the place of a number.

(Nick Ovarlee, Cresthill Middle School, Douglas County, CO)

The important thing about mode is that it is the most frequently occurring number in a set of numbers. It’s the number on a dot chart with the most dots. Sets of data can have more than one mode or no mode at all. It’s the number in a set of data that repeats itself once or more. But the important thing about mode is it’s the most frequently occurring number in a set of numbers.

(Jon Watson, Cresthill Middle School, Douglas County, CO)

14. **Inside-Outside Circle:** This cooperative learning structure, developed by Spencer Kagan (Kagan Publishing and Professional Development, San Clemente, CA), lends itself to review of factual material and recall/comprehension questions. Directions to students are as follows:

- On an index card, write a question that you could answer from something we talked about/you learned today (this week, etc.).
- Turn the card over and write out the answer.
- Stand and form a circle around the room.
- Letter off A-B-A-B.
- A’s take two steps forward, turn, and face a B.
- Ask your question of your partner. If she has trouble answering it help her.
- Switch roles—B, ask your question of A.
- Switch cards—A, take B’s cards, and B, take A’s cards.
- Turn to your left 90 degrees.
- Walk two spaces in the direction you are facing and turn and face a new partner.
- Ask your old partner’s question of the new partner.

This can continue for as long as there is time to review.

Variation: Students write several questions initially in case they face a partner who has written the same question.

15. **I Used to Think...But Now I Think:** As demands on student thinking call for increased metacognition about what one is thinking and how one’s thinking is changing, this routine helps them track those shifts. Through this routine students have the opportunity to consolidate new learning because they articulate their developing beliefs, opinions, and understandings. This tool



could be used after students read new information, watch a film, listen to a speaker, experience something new, engage in a class discussion, or as a cumulative reflection after a unit of study. Have students share and explain their shifts in thinking.

16. **Last Word:** Students brainstorm all the things they can remember about a topic they have been studying. Then, after writing that topic or an associated term vertically down the side of a page, they shape and elaborate those ideas, using the letters of the topic or term to start relevant sentences or phrases. After students have watched a film about butterflies, for example, they are directed to “Write a word or phrase about butterflies using each letter of the word. Check to ensure that in the overall summary you have listed critical attributes or information about the life of a butterfly.” The criterion for completion is, “Have you captured all of the most important ideas about the topic? Are there any trivial lines that need to be revised?” Following is an example from a geology lesson:

P Pangaea was a prehistoric land mass, the basis for present continents.

L Lifts land in some places.

A Always moving land somewhere.

T Tectonics is from the Greek, meaning builder.

E Earthquakes happen at plate boundaries.

T The movement of the plates is predictable.

E Earth is sometimes buried by plate movement.

C Crustal movements cause earthquakes.

T Trenches come from subduction.

O Oceans contain a ridge where plates separate.

N New land is formed by volcanos.

I Iceland is along a plate boundary.

C Continental drift theory explains the movement of continents.

S Spreading occurs at mid-ocean ridges.

17. **Learning Buddies:** Designate groups of three students who don’t usually work with each other and have them get together periodically during instruction to summarize and review what has been taught. This serves as an energizer as well as an opportunity for the teacher to create groups specifically designed for this purpose.

18. **Learning Logs:** Students make journal entries during the last five minutes of each period, responding to the following types of questions:

- What was one important thing you learned today?
- What helped you to learn in today’s class?
- What puzzled you?
- What did you enjoy, hate, accomplish in class today?
- How did you learn from the discussion or lesson?
- How would you rate your performance in class? Explain your answer.

(Idea from Arlette Sanders. 1985. Learning Logs: A Communication Strategy for All Subject Areas. *Educational Leadership*, vol. 42, no. 5 [February], p. 7)



19. **Luck of the Draw:** To institute a routine for incorporating a three- to five-minute summary of the previous day's lesson at the beginning of each class, all students' names are put in a fishbowl. For several days the teacher begins class with a summary of key points from the day before. Students check their notes to insure that they have the ideas mentioned or record the key points again at the beginning of their notes for the current day's class. Once students have seen this modeled a sufficient number of times, the teacher announces that tomorrow this summary will be done by one of them, with a reminder to take good notes because any one of them might win "the luck of the draw for tomorrow." At the end of class a student reaches into the fishbowl and pulls out a name (or pair of names) to identify who will be in charge of summarizing at the start of the next day's class. As an attention move, the name for the next day can be drawn at the beginning of class but not be announced until the end of the period. If students are asked to summarize in writing, a class notebook can be created for reference for students who are absent.
20. **Medium-Size Circle:** This format has students seated in a circle (or half in a circle and half standing behind those who are seated) and begins with a prompt for students to respond to voluntarily as they are ready to do so. The intent is to create a nonthreatening opportunity for students to share their thoughts, opinions, recollections, or questions about a topic, concept, or issue, and to surface that information as a backdrop for instruction. As a closing activity students seated in the circle might respond to prompts like: "One thing I learned today about _____ is ..."; "Something I didn't quite understand today was..."; "A connection I made to what we read today is..."; "Something I'd like to hear more about tomorrow is..." Typically a Medium-Size Circle includes three rounds: the first half of each round involves five to seven students sharing thoughts; the second half involves students remembering who spoke and what they had to say. This is not a dialogue format: students don't react to/agree or disagree with one another's thoughts; they merely listen and add their own thoughts. Thus, this format also serves as an opportunity for students to practice listening and attending nonjudgmentally to the ideas and opinions of others. More detailed directions for this format are provided in a separate handout elsewhere in this notebook.
21. **Memory Jogger Review:** Memory Jogger Review is a summarizing structure that enables teachers to focus students' processing attention on the most important concepts in a study and provides students the opportunity to review these concepts to increase the likelihood that information moves from working memory to short-term memory. The teacher creates a grid and fills each cell with pictures and/or text that prompts students to record information about one of the most important concepts from a unit of study. Each cell has space for students to record a response to the prompt. Some teachers have students also record reference page numbers so that the Memory Jogger Review can be used as a study tool. The structure can be used in a variety of ways. One way is to first prompt students to independently familiarize themselves with the content in the grid and work to fill out as much as they can within a fairly brief time frame. Then students are prompted to meet with a partner and discuss their initial responses, which may include revisions and elaboration. And finally, partners bring their collaborative thinking to a small group where they report their summarized points and ask questions to clarify gaps and misconceptions. Another way to use Memory Jogger Review is to prompt students to fill out the grid as homework and then come to class ready to meet with a partner or small group to report summaries and confusions. An example of a Memory Jogger Review is included in a separate handout elsewhere in this notebook.



22. Numbered Heads: This activity allows students to discuss the answer to a question but then holds each individual accountable for knowing it. To set up the activity, divide the class into groups of 4 and have each group number off from 1-4, so that each student in the group has a different number. Ask a question and allow time for groups to discuss the answer. Call a number between 1 and 4, e.g., 3, and all 3s should raise their hands. Call on a 3 to answer the question. To make the activity more challenging and to check for understanding, ask the person to explain his/her answer. Try not to go in order so that students won't be able to anticipate which number will be called. Also, you might call a number more than once before getting through all the numbers. Using a spinner or picking numbers from a cup can make it more random.

23. One-Question Quiz: Given a question focusing on an important aspect of the class period or an assigned reading, etc., students write while the teacher circulates around the classroom.

24. One-Word Summary: Write one word that represents or summarizes a concept or topic studied in class; then write two to three sentences that explain why you chose that word.

25. Paired Verbal Fluency: This format involves about three minutes of structured brainstorming about a topic between pairs of students and works well when students have taken in a lot of information about a topic. It usually includes three rounds of brainstorming, with each partner getting equal "air time" in every round. Given a topic they have been studying, students are asked to brainstorm everything they remember or think they remember about that topic. Partner A brainstorms for 45 seconds, sharing everything s/he can think of related to the topic. During this time Partner B listens only and doesn't speak. At a signal, partners switch roles and B becomes the talker while A listens. This completes one round. The next two rounds follow the same pattern; students continue to add more that they know about the topic but the time for each round is usually a bit shorter (30 seconds for round two, 20 seconds for round three).

The benefit of this activity lies in having students articulate, and thereby support retention of, what they have been learning. If time permits, a follow-up activity might be to have students identify disagreements or discrepancies in what they have talked about with their partners in order to clear up any confusions or misinformation.

26. Prep Notes: This is a format that is most suitable for middle school or high school use. When students are getting ready to take a test, one teacher allows them to bring "prep notes" to the test. They are directed to make note of things that they believe will be on the test and that they will have a hard time remembering. Each student creates his/her own prepared notes and is allowed to use them during the test. At the beginning of the semester, students are allowed to bring a full page of notes. The next time they are allowed to bring only a 4 x 6 index card. The next time it's a 3 x 5 card. Eventually they have to take tests with no notes. Prep notes are turned in with the exam. The teacher looks over the notes and, throughout the semester, works with students on how to remember some of the items that they needed to include in their notes (e.g., mnemonics, sequence, Principle of Learning, etc.) so that they can become increasingly less dependent on the notes.

27. **Reciprocal Teaching:** Created by Annemarie Palincsar and Ann Brown (University of Illinois), this format incorporates four reading comprehension strategies that must be taught to students: questioning, summarizing, clarifying, and predicting. After reading a short passage or paragraph, readers take turns “teaching it.”

The teacher first models the four components involved in “teaching” a passage:

- Posing questions about the selection (something that was unclear, something that was puzzling, a curiosity about the motivation of a character, a question about how something is related to something else, a question that gets at the central point of the text, etc.)
- Summarizing the key idea(s) contained in the passage
- Clarifying by addressing confusing parts and attempting to answer questions raised above
- Predicting what will come next

Everyone then reads another paragraph and the process continues. Once students have seen sufficient modeling they begin to take on the role of the teacher with guided practice.

When students have internalized this format for summarizing they might use it while doing partner reading: one reads out loud, the other “teaches” what has been read, and then they switch roles.

Some teachers have students work in groups of four, with each student assigned one of the four roles on a role card containing prompts to remind them of what to do in their role. After each passage the role cards can rotate within the group so that students get to practice all four roles.

(For more information on Reciprocal Teaching visit the Web; there are a number of sites that explain the process in detail.)

28. **Relay Summary:** This format is used to summarize an assigned reading. Students are divided into teams of four or five students. The first student in each team starts with a blank piece of paper and writes one summary sentence, then passes it to the next teammate. That student adds a sentence, passes it on, etc., until the whole team has added a sentence or until the number of required sentences are on paper.

Variation for primary students: After listening to *The Velveteen Rabbit* on tape, students retold the story in pictures. The first student in the group drew a picture of the first event remembered, then passed the paper to the next student, who drew the next event, etc., until the story was retold in pictures. When the class reconvened as a large group, each team of students shared their summary of the story, with each team member retelling the part s/he had drawn.

29. **Sorting Cards or Pictures:** This format can be used with any topic, concept, or process that can be summarized by showing relationships between ideas (sequencing events, grouping terms/ideas, creating a hierarchical structure, etc.). Students receive packs of cards with terms written on them or displaying pictures, and they sort the cards as appropriate to the relationship that needs to be understood. As a review for an exam, Judy Ross gives her ninth-grade biology students 30 cards with facts about different layers of the earth’s atmosphere and four different colored pieces of construction paper. Her instructions are for students to “Label each of the colored sheets with a layer (‘troposphere,’ ‘ionosphere,’ etc.), order them on your desks, and then sort the facts into the layers they apply to. If you aren’t sure, don’t guess; look them up!” Students who are studying the human body might sort cards naming or displaying parts of the body into related systems, or those studying historical events might sort their cards into the proper chronological sequence.



30. **“Summary Sam”**: Using a prop (such as a puppet), this format offers a way of encouraging participation in summarizing events, concepts, skills, etc. by primary students. A kindergarten teacher who found that fewer and fewer students were participating in the end-of-the-day summary of the day’s events brought an owl puppet to the meeting one day. Students had been learning about nocturnal animals, so “Sam” (the owl) whispered in the teacher’s ear that he “regretted missing everything that went on during the daytime while he was resting and wondered whether the children would tell him about all of the interesting things they had done that day.” This was all it took to re-engage students in participating in the summary.

Extension: A first-grade teacher records the “story of the day” as the kids talk and then makes a copy for each student to take home and share with their parents.

31. **Synectics Review**: Synectics means “bringing together diverse elements.” Used as a summarizing structure, the idea is to have students make connections between something very familiar to them and the new topic, concept, or skill they have been studying. The basic format is to think of as many responses as possible to:

_____ is like _____ because...
(something new studied in class) (some familiar object or thing)

Have students brainstorm a list of 10 to 15 things that are very familiar to them. Objects with moving parts work especially well. Then select (or have students select) the familiar object to insert in the second blank above.

*An **atom** is like a **grapefruit** because...*

- *both have an outer layer: grapefruit has skin, atoms have electrons orbiting*
- *both combine with other things to form interesting combinations: grapefruits with other fruits in fruit salad, atoms with other atoms to form molecules and compounds*

***Owls** are like **potatoes** because...*

- *both have eyes*
- *both have outer coverings: a potato has skin and owls have feathers*

Variations: (1) Visual Synectics: Create a set of index cards that have a picture on each of everyday familiar objects. Be sure to include objects with moving parts on some of the cards. Distribute the cards at random (or have students pick a card from the deck) and use that as the familiar object for comparison with something new being studied in class. (2) Four-Box Synectics: Create a 2 x 2 (four boxes) grid. Have students generate a list of familiar objects and put one in each of the four boxes. Then have them make connections between the new topic, concept, or process and each of the four items in the boxes.

32. **Thinking Logs**: Similar to Learning Logs (above), this is a format for having students do some sort of journal response in the last few minutes of the period. The format is called Thinking Logs because the prompts given to students are based on the type of thinking you want students to do.



33. **Think-Pair-Share:** This is a format designed to get more students actively participating anytime we pause to give them time to process, summarize, or respond to a question to check for understanding. In a three-step process the teacher (1) poses a question or a prompt for students to respond to and directs students to “think” about it for a few seconds on their own; (2) asks students to “pair” (turn to or get with a partner) and discuss their responses; and (3) directs a random sample of students to share their thoughts with the class. Thus all students are actively engaged during Step 2 and have the opportunity to rehearse a response with a partner before having to speak in public.
34. **Three-Two-One Bridge (3-2-1 Bridge):** A thinking routine, 3-2-1 Bridge asks students to uncover their initial thoughts, ideas, questions, and understandings about a topic and then to connect these to new thinking about the topic after they have received some instruction. Whenever new information is acquired, bridges can be built between new ideas and prior understanding. The focus is on understanding and connecting one’s thinking, rather than pushing it toward a specific outcome. After the experience, students might be given the opportunity to revise their original 3-2-1 Bridge, or to complete a new one, explaining shifts in their thinking. An example used with a 10th grade Physical Education class can be found with the Activators on page 141.
35. **Ticket to Leave:** A ticket to leave prompt for a kindergartener might be to show how to change “rope” to “hope” on her whiteboard before being dismissed for snack, or for an eighth grader to identify a range of parts of speech by determining the derivational suffix of several words, or for a junior to highlight three passages from a poem that indicate the theme of the text. A ticket to leave can provide insight into students’ skills, comprehension, and even reflection, too. For example, in a second grade classroom, students are prompted to record one misconception that was cleared up after watching a video of life in Ghana. Or, P.E. students are prompted to record and rate their efforts at working toward their fitness goal. The ticket to leave is used to promote student thinking and reflection and to provide the teacher with information that will influence planning for the next learning experience.
36. **Write a Rap:** Students create rhymed verse (couplets), set to a beat, summarizing key ideas about something studied.

*Here’s a little story I’d like to tell
About Odysseus the Greek king we know so well.
The Greeks had an army with a lot of force
They tricked the Trojans with a wooden horse.
The soldiers popped out to their surprise.
The Trojans didn’t know it was just a disguise.

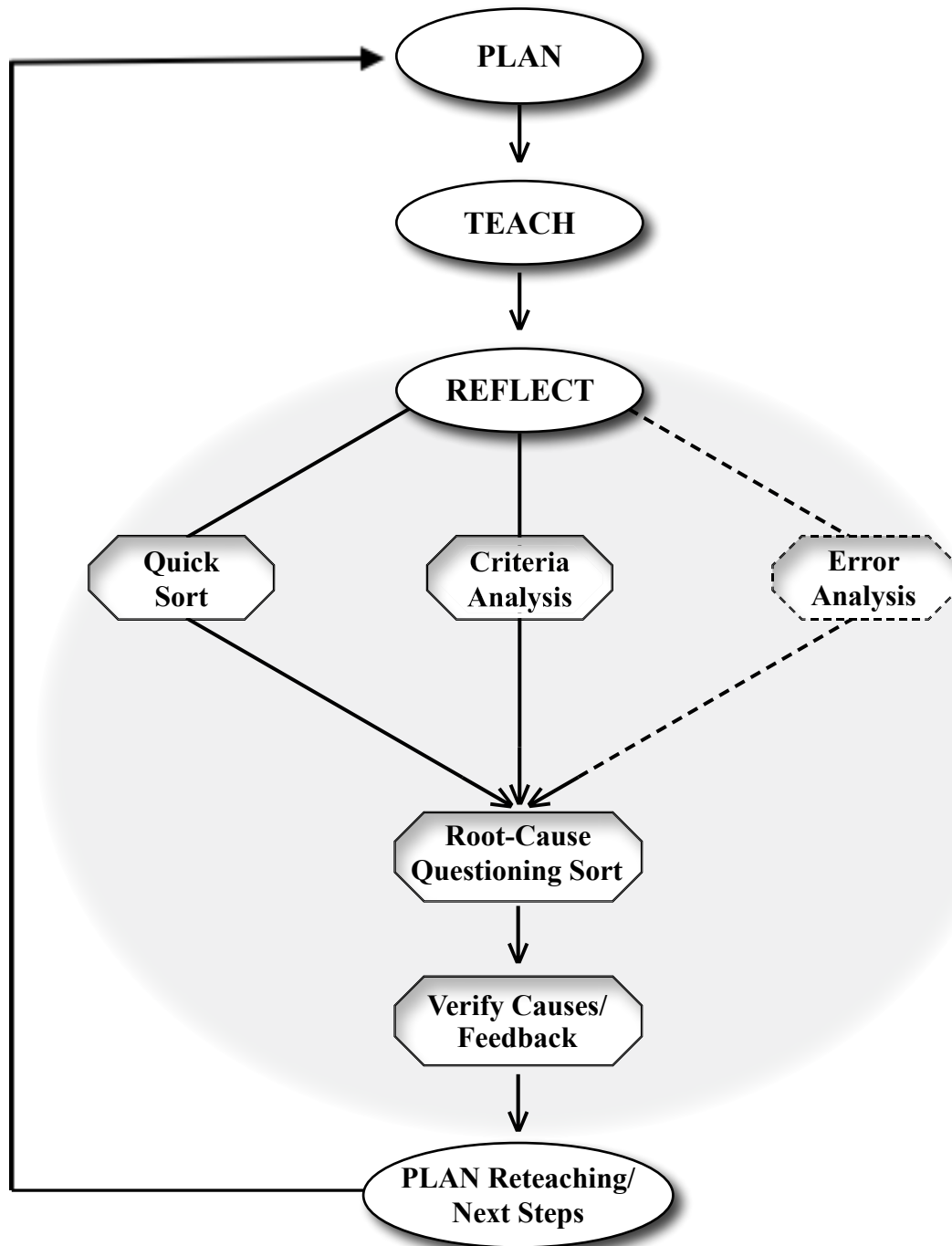
Circe made a fool of Odysseus’ men,
She turned them into pigs and put them in a pen.
The gods gave Odysseus a magic drink
Which made her turn them back as quick as a wink.
Then she became the best of a friend,
But after a year it came to an end.*

(Part of a rap written by Karen Armstrong’s Grade 5-6 English class, James Caldwell Middle School, Caldwell, NJ)

For more information, see Jon Saphier and Mary Ann Haley. 1993. *Summarizers: Activity Structures to Support Integration and Retention of New Learning*. Acton, MA: Research for Better Teaching.



Plan-Teach-Reflect Cycle



Plan-Teach-Reflect Protocols Description

PLAN

On the “Planning Protocol” sheet:

1. Identify and write out the subject-specific standard(s) related to this lesson (CCSS, NGSS, national/state/local standards).
2. Construct and record the mastery objective(s) for the lesson. Pay careful attention to the level of performance/kind of thinking (performance verb) you plan for students to be learning; avoid objectives that are activity driven. Refer to *The Skillful Teacher*, page 377, for the wording of a well-written objective.
3. Determine what will be present in the student work when they have met the objective (criteria for success) and record the criteria in the table on the “Planning Protocol” sheet. Refer to *The Skillful Teacher*, page 378, and to examples in the binder in the Planning section for the wording of well-written criteria for success. Do not yet determine the formative assessment tool that will be used to collect this data.
4. Plan for and record the formative assessment process to be used throughout the lesson to collect data and track students’ progress toward reaching the objective. Select one of the data-gathering tools you will use toward the end of the lesson that requires students to apply the criteria for success. Record the name of this data-gathering tool on the blank line above the list of criteria for success.

TEACH

Teach the lesson. Gather the set of student work from the formative assessment tool named above.



REFLECT

5. Analyze and reflect on students' performances in reaching the lesson's objective using one or both of the following protocols:
 - a. Quick Sort Protocol
 - Sort the data into three piles: student work that
 - Does not yet meet the objective.
 - Meets the objective.
 - Exceeds the objective.
 - **On the "Quick Sort Protocol" sheet:**
 - Record the number of student work samples in each pile.
 - Analyze each pile, making notes about errors, misconceptions, gaps, and insights.
 - b. Criteria Analysis Protocol
 - Examine each piece of student work (audio, video, photo, writing) one at a time.
 - **On the "Criteria Analysis Protocol" sheet:**
 - Record the degree to which *each* criterion is present in each piece of student work. For work that is missing evidence of a criterion, make notes about the error or confusion. For work that meets a criterion, use (✓), and for work that exceeds a criterion, use (+).

On the "Root-Cause Questioning Protocol" sheet:

6. For criteria in which students have "not yet" performances, brainstorm and record possible root causes as to why students have not yet met each specific criterion.
7. Determine how you might gather additional data to verify the accuracy of one of the most likely root causes.

On the "Next Instructional Steps" sheet:

8. Specify plans for what happens next in students' learning based on the analysis of their performances. Describe the corrective and extension activities on the "Next Instructional Steps" sheet.



Planning Protocol

PLAN

- 1.** The national/state/local standard(s) that students are working toward in the lesson.

- 2.** Mastery objective: What do you want students to know and be able to do as a result of this lesson?

- 3.** Criteria for success checklist:

Your _____ includes...
 (insert the name of the product/performance identified in #4 below)

A	
B	
C	
D	
E	

- 4.** A detailed description (or a copy) of the formative assessment product or performance you will use during or after instruction to gather data on student achievement of the objective.



Quick Sort Protocol

REFLECT

5a. Analyze and reflect on students' performances.

Mastery Objective:			
	Not Yet	Meets	Exceeds
Number of Students in Each Category			
Notes Describing the Errors, Misconceptions, Gaps, and Insights in Students' Work (Identify these for each category of student performance)			



Root-Cause Questioning Protocol

- 6.** Conduct a root-cause analysis for why specific criteria were not met or errors were made.

Criterion/Error	Possible Root Causes of Why a Criterion Wasn't Met or Why an Error Was Made

- 7.** Determine how you might gather additional data to verify the accuracy of a most likely root cause.

Most Likely Root Cause	Additional Data to Verify Root Cause



Name _____ Grade and Subject _____

Feedback Planning Sheet

Based on the performance patterns identified during the criteria analysis, write feedback for work that doesn't yet meet the criteria, meets the criteria, and exceeds the criteria:

Focus Criterion	Not Yet	Meets	Exceeds
EXAMPLE: <i>Your argument has an acknowledgement of alternate or opposing claims.</i>	<i>Your argument puts forth your claim with supporting evidence. The argument does not yet acknowledge alternate or opposing views.</i>	<i>Your argument states your claim and introduces your audience to an alternate claim.</i>	<i>Your argument stays focused on a specific claim and uses the refutation of opposing claims to strengthen your reasoning.</i>



Student Self-Assessment and Feedback Process

1. Create a self-assessment tool, e.g., a criteria for success checklist, that outlines the criteria for a task and provides space for student self-assessment and teacher feedback.
2. Teach a planned lesson, including communicating the objective and criteria for success to students. Collect, or take observational notes on, students' performances, including ways in which students initially used the criteria to perform or revise their work.
3. ***Without marking the students' papers***, analyze individual performances using a matrix to record the performance levels of each piece of work on each criterion: not yet proficient (NY) , proficient performance of criterion (✓), and exceeds criterion (+). Calculate and record the cumulative raw scores for each criterion.
4. Report back to students the aggregated raw score data for each criterion without indication of individual performances.
5. Where appropriate, refocus students on the criteria, clarify what it means to self-assess, and/or reteach a frequently missed criterion.
6. Return ***unmarked*** work to students and provide an opportunity for students to use the criteria self-assessment tool (checklist) again to revise and improve their performances through careful self-assessment. If observational data were collected on a performance, resimulate the experience so that students have an opportunity for further practice and self-assessment to improve their progress toward the objective.
7. Collect revised work. For a second time and in a contrasting color, display students' individual performances by criterion using the original matrix to record the performance levels of each piece of work on each criterion: not yet proficient (NY) , proficient performance of criterion (✓), and exceeds criterion (+). Again, calculate and record the new aggregated raw scores for each criterion.
8. Analyze evidence of changes in students' performances and report back to students both the new aggregated data and anonymous descriptions of improvements in the revised work.
9. Based on your analysis, provide and record examples of feedback for students to use in a third opportunity to adjust their performances.



Focus Area

- Matrix representing student performances:

+ = Exceeds criterion

1st: Students' initial submissions
2nd: Students' revised submissions



ERROR ANALYSIS _____ (Formative Assessment Task or Assignment)

Error Analysis Quick Sort Protocol

As you study each sample of student work, start to identify the types of errors you see (or components of the work that are missing) in relation to the criteria for success. Record error type across the top of the columns. As you look at each piece of work: 1) add any new types of errors you are seeing to the top of a new column and 2) track what you find in each piece of work by highlighting each column where an error appears in that piece of work, or by marking the appropriate box with an x.

Possible Errors → Student	A	B	C	D	E	F	G	H
1.								
2.								
3.								
4.								
5.								
6.								
7.								
8								
9.								
10.								
11.								
12.								
13.								
14.								
15.								
16.								
17.								
18.								
19.								

(cont. next page)

(Formative Assessment Task or Assignment)

[illegible]



ERROR ANALYSIS: Five Key Questions

1. What might the students have been thinking to make this error? What are our hypotheses?
2. How can we find out which of our hypotheses is true?
3. What different instructional strategies could we use to fix or undo whatever led to this error and to help students solidify their skills and concepts?
4. How are each of us going to plan and manage time and tasks in class so that we'll get 15 minutes (or whatever it takes) to re-teach the skills and concepts? [Target at least two times a week for groups of students who don't have it.]
5. How can the team help? Determine whether there is a way to share/exchange knowledge, skill or students to benefit both students and colleagues.

Item Analysis Protocol

Purpose

- To analyze student performance on individual test items, including the percentage answered correctly for each item, distractor patterns, and scores on open-response items
- To lead to effective and targeted action

Suited for What Type of Assessment

- Assessments with multiple items (e.g., matching pre-post, benchmark, or interim; short readiness or diagnostic)

Materials

- Item Analysis Prediction Table
- Item Analysis Table: Multiple-Choice
- Item Analysis Table: Open-Response with Success Criteria
- Item Analysis Table: Open-Response with Rubric
- Data-Driven Dialogue: Note-Catcher
- Assessment results reported at the item level to be analyzed

Process

Review assessment items	Engage in Data-Driven Dialogue				Prepare to take action
	Phase 1: Predict	Phase 2: Go Visual	Phase 3: Observe	Phase 4: Infer/Question	

Review Assessment Items

- Review relevant unit essentials, learning targets, success criteria, and assessment items.
- If a test blueprint is available, review that.

Phase 1: Predict

- Questions to consider:
 - How do you think students performed?
 - What item/learning target/unit essential do you think they will do well on? What do you think they will have trouble with?
 - What errors or confusions do you anticipate students will make/have?
 - Based on what assumptions?
- Use the Item Analysis Prediction Table to record your predictions for each item. They can be in the form of general statements (e.g., “Students will do well on this item because we have gone in depth with this target”) or as a percentage correct (e.g., “About 90% of students will get this item correct because their previous work on this learning target demonstrated mastery”).

(cont. next page)



Phase 2: Go Visual

- Select from among the three displays provided (Item Analysis Table: Multiple-Choice; Item Analysis Table: Open-Response with Success Criteria; Item Analysis Table: Open-Response with Rubric) the one that best matches your data to display results for each item.
- Bar graphs can also be used to display performance on each item.
- Determine criteria for Stoplight Highlighting (e.g., cut points to distinguish urgent areas or comparisons with state, district, or similar schools); for percentage correct; for distractor (incorrect responses) patterns; or for rubric scores (if analyzing open-response items) and Stoplight Highlight accordingly.

Phase 3: Observe

- What kinds of items are on the test? In what content strands? At what level of difficulty?
- What specific learning targets/unit essentials/standards are our students' strengths? Which pose difficulties for them?
- What are items of relative strength? Weakness?
- For which items are students frequently giving the same incorrect answers?
- On what types of questions, such as short-answer, extended-response, or multiple-choice, do our students perform well? Which pose difficulties?
- For open-ended responses, on which rubric criteria are students scoring high? Scoring low? How low?

Phase 4: Infer/Question

- Why might so many of our students have done well at a particular item?
- Why might so many of our students have missed a particular item? If the item is an open-ended response:
 - Why were students missing points on the rubric?
 - What criteria were missed?
- What might students have been thinking to make the errors that they did?
- How can we find out which of our hypotheses is right?
- What questions do we have?
- What additional data might we explore to verify our explanations?

Prepare to Take Next Steps:

- Summarize findings in a problem/goal statement
- Identify priorities for solutions, e.g. verifying causes, reteaching, extension



Item Analysis Prediction Table

Formative Assessment:

- Record your predictions for each item. They can be in the form of general statements or as a percentage correct.

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Van Krey Reflection Sheet

Mr. Van Krey's Daily Effort Log: Self-Assessment

NEXT WEEK'S LEARNING

TARGET _____

1) What did you accomplish since leaving our last class together?

Specifically how did you accomplish this? If you didn't, what got in your way? How will you get around this next time?

2) As a result of class today, what do you understand now that you didn't before? OR what can you do more proficiently than you could do before? What did you get out of class today?

3) What is your specific plan for tonight to reach next week's learning target? Have you met the goal for all previous learning targets, if not, what are you doing to address this? What do you need to learn and be able to do that you can't do yet? If you are ready for next week's goal, what are you going to review that you learned in a previous unit?

Error Analysis: Van Krey Example

Name _____ Quiz Date _____

Score: _____ % Mastered: yes no Retake: yes no If 'Yes' when? _____

Reflection/Error Analysis

1. Explain why you made errors – what got in your way? How will you avoid this mistake next time?
2. What can you do now that you couldn't do two weeks ago?
3. What are effective ways that you have learned this material? What homework/classwork helped the most?
4. If you got less than 80%... what's your plan for mastery (be specific).

Thanks to Michael VanKrey at Evanston IL High School for sharing this idea.



Analyzing End-of-Unit Assessment Data: Reflection Questions

The following reflection questions are designed to guide teams in analyzing end-of-unit assessments in preparation for taking action and reflecting on the unit as a whole. Note that the questions correspond to different levels of analysis. Choose those questions that correspond to the data you that you have available.

Aggregated Data: The big trends

1. What percentage of our students scored at each proficiency level or received each grade?
2. What's the good news here? What are we concerned about?
3. How do these results compare to those of a previous unit?
4. How will we meet the needs of students at each proficiency level going forward? (Recommended to drill into item-level data [see below] and conduct error and criteria analysis to get a clearer idea of what they need.)

Disaggregated Data: Results separated by race/ethnicity, language, economic status, and/or educational status

5. What achievement gaps between demographic groups (e.g., race, free-and-reduced lunch, language status, special education status) are evident in the results?
6. How do achievement gaps on this assessment compare with those of previously given assessments? Is the gap widening or narrowing?
7. If the gap is narrowing, what practices have we implemented that we think might account for that? How can we strengthen and spread use of these practices?
8. What will we do to narrow achievement gaps in the next unit?

Unit Essentials/Learning Target Data: Results reported by performance on individual unit essentials or learning targets

9. Which unit essentials/learning targets are our students' areas of strength?
10. What practices are we using that might account for these successes?
11. How can we strengthen and spread use of these practices? How can our team help?
12. Which unit essentials/learning targets are areas of need for our students?
13. How might we teach these essentials and learning targets better next time?
14. What might we do to address these areas of need immediately? (See Item-Level Data below.)

Item-Level Data: Results reported by percentage correct for each individual assessment item, by percentage choosing distractors with multiple-choice items, and by percentage scoring each rubric score on open-response

15. What items did our students do well on? Why?
16. Which items posed the greatest challenges? Why?
17. Which distractors (wrong answers) are students frequently choosing in multiple-choice questions? Why?
18. What might we do immediately to address these areas of need? To unravel students' misconceptions?

(cont. next page)



Student Work: Student products or performances (e.g., writing, mathematics responses, art projects, oral presentations)

19. What criteria for success are our students doing well on? Why?
20. For which criteria are they frequently not yet proficient? Why?
21. Why are our students missing points on open-response?
22. What errors or confusions are evident in the work?
23. What might we do immediately to address these areas of need? Unravel students' misconceptions?

Overall

24. What worked well in this unit that we want to continue doing?
25. How can we improve the curriculum and instruction the next time we teach this unit?



Investigate and Verify Causes Tool

Purpose

- To collect additional evidence for the purpose of verifying a hypothesis about student thinking and/or causes of errors, misconceptions, or gaps in student understanding
- To lead to effective and targeted FIRME action

Suited for Which Type of Assessment Data

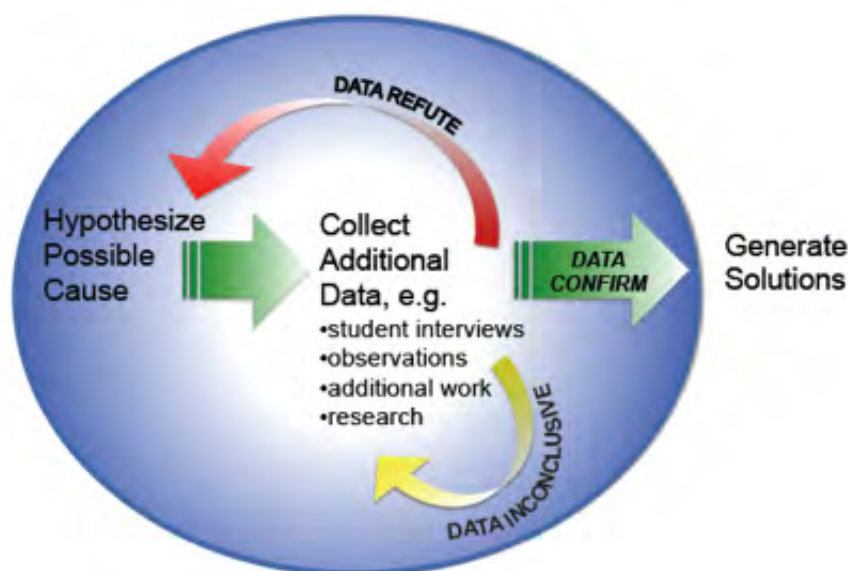
- Short-cycle (after multiple lessons), medium-cycle (end-of-unit), or benchmark or annual (long-cycle)

This tool can be used after the team has analyzed assessment data if they remain uncertain about what is causing student errors or poor performance. Further investigation to verify causes, rather than jumping to premature conclusions and failing to solve the problem, is often worth the extra time and effort.

Process

The graphic below illustrates the process for investigating and verifying causes:

- “Hypothesize Possible Cause” represents the team’s inference about what is causing the errors, misconceptions, or gaps in student thinking observed through data analysis.
- “Collect Additional Data” represents the various data sources the team might use to verify their hypothesis.
- Once they have collected the additional data or research, the team analyzes the data to determine if they confirm or refute their hypothesis or are inconclusive.
- The arrow labeled “Data Confirms” illustrates that if the team has verified their hypothesis, they move on to generating solutions.
- The arrow labeled “Data Refutes” shows that if the data do not support the hypothesis, the team revises their hypothesis.
- The arrow labeled “Data Inconclusive” illustrates that if the data neither confirm nor refute their hypothesis, the team undertakes additional data collection.



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The template below can be used to put this process into action:

- Write the hypothesis or question that your team will be investigating in the first row.
- Determine what additional evidence is needed in order for the team to have confidence in their hypothesis and to generate appropriate solutions. For example, you might decide to ask students to explain their answers verbally or in writing, observe students as they are working, or look to research on misconceptions.
- Enter what additional data will be collected and how in the second row: Additional Data/Research to Collect, How, By Whom, and When.
- Between meetings, collect evidence and come to the next meeting ready to present and analyze evidence, draw conclusions, and plan next steps.
- Use the Findings (Observations) section of the template to record observations of the data.
- Use the Conclusion section to record the conclusion drawn from the data analysis. If the data confirm your hypothesis, record that in the Verified or Revised Hypothesis section and proceed to generating solutions. If the data refute your hypothesis, revise the hypothesis and record the new hypothesis in the Verified or Revised Hypothesis section. Collect additional data if needed until you have verified a hypothesis; then proceed to generating solutions. (Initial data collection may be sufficient to support a revised hypothesis. If the data are inconclusive, and time permits, your team may decide to collect additional data.)
- Record solutions (e.g., feedback and or reteaching strategies) in the final row of the template.

Additional Resource for Verifying Causes

Love, N. Stiles, K. E., Mundry, S., & DiRanna, K. (2008). *The Data Coach's Guide to Improving Learning for All Students: Understanding the Power of Collaborative Inquiry*. Thousand Oaks, CA: Corwin. (See Chapter 5 and Toolkit: Cause Cards, Fishbone Cause-and-Effect Analysis, Verify Causes Tree, and Why? Why? Why?)



Verify Causes Template

Hypothesis to Test:			
Additional Data/Research to Collect (e.g., student work, interviews, research on misconceptions):	How:	By Whom:	When:
Findings (Observations):			
Conclusion: _ Hypothesis confirmed (complete template sections below) _ Hypothesis refuted (write revised hypothesis below or repeat sections above as needed) _ Hypothesis inconclusive (redo sections above as needed)			
Verified or Revised Hypothesis:			
Solutions (e.g., Feedback or Reteaching):			



Investigate and Verify Causes: Questions to Consider

When investigating possible causes of persistent student-learning problems, it is important to:

- Avoid blame, finger-pointing, and stereotyping
- Be guided by a growth mindset
- Focus on causes that have high impact on student achievement and over which the team and/or the school has control

The questions listed below can be helpful in “looking for love in all the right places,” that is focusing on high-impact causes over which the team or school has control. This kind of questioning can be incorporated into Phase 4: Infer/Question of Data-Driven Dialogue and often leads to additional data collection to verify causes before taking action.

- **Curriculum**
 - Did we teach it? In enough depth? Placed in the right sequence? Frequently enough? At the appropriate level of rigor?
 - Were the learning targets clear to students?
 - Were our instructional activities aligned with the targets?
- **Instruction**
 - Did students have the prerequisite skills and knowledge to undertake the task?
 - Did they understand the task?
 - Were the success criteria sufficient and clear?
 - Did we use a variety of modalities in our teaching?
 - Was our instruction clear?
 - Did we provide adequate time for students to practice with feedback?
- **Assessment**
 - Did we use ongoing formative assessment to explore student thinking and build on it in our instruction?
 - Did we communicate to students how to improve?
 - Did we help students self-assess?
 - Did we motivate their learning?
- **Equity**
 - Did we communicate high-expectations messages to our students?
 - Did we provide students with equal access to rigor?
 - Did we examine attitudes or practices that might contribute to achievement/relationship/teaching gaps?
- **Critical Supports**
 - Do we have systems of support in place for students who need extra help?
 - Do we have high-functioning teacher teams that focus on improving teaching and learning?



Action Plan for Grade-Level or Content Teams

SMART Student-Learning Goal:		
Instructional or Reteaching Strategy We Agree On	Monitoring Implementation: How Will We Know We Did It?	Monitoring Student Learning: How Will We Know It Worked?



Action Plan

Goal:		
Solutions We Agree to implement: What Action Are We Going to Take?	Monitoring Implementation: How Will We Know We Did It?	Monitoring: How Will We Know It Worked?







Demographic Achievement Data

TGC = total # in - or percent of Graduating class

TURM = Traditionally Under-represented Minorities - need to see this parsed out further (disaggregate the TURM)

	Total Grad Class		Grad w Hi Honor		Grad w Honor		Mean GPA		Mean SAT (1600)		Mean SAT (2400)		Mean ACT	
	TGC	TURM	TGC	TURM	TGC	TURM	TGC	TURM	TGC	TURM	TGC	TURM	TGC	TURM
2014		76		9%		13%		3.22		1130		1713		25
2015		112		13%		25%		3.33		1140		1729		25
2016	360	71/20%	21%	20%	21%	20%		3.42	1212	1159	1829	1747	26	25

LD = Grads with Documented Learning Differences

	Total Grad Class		Grad w Hi Honor		Grad w Honor		Mean GPA		Mean SAT (1600)		Mean SAT (2400) w reasoning		Mean ACT	
	TGC	LD	TGC	LD	TGC	LD	TGC	LD	TGC	LD	TGC	LD	TGC	LD
2014														
2015														
2016	360	48/13%	21%	4%	21%	8%	3.43	3.07	1212	1162	1829	1735	26	25

Magis Grads = overlaps with underrepresent minorities (have to be from TURM or first person in family to be college bound SES and level of parent education – two greatest predictors)

	Total Grad Class		Grad w Hi Honor		Grad w Honor		Mean GPA		Mean SAT (1600)		Mean SAT (2400) w reasoning		Mean ACT	
	TGC	Magis	TGC	Magis	TGC	Magis	TGC	Magis	TGC	Magis	TGC	Magis	TGC	Magis
2014														
2015														
2016	360	56/15%	21%	14%	21%	14%	3.43	3.29	1212	1136	1829	1702	26	22

Grads who Receive Financial Assistance

	Total Grad Class		Grad w Hi Honor		Grad w Honor		Mean GPA		Mean SAT (1600)		Mean SAT (2400) w reasoning		Mean ACT	
	TGC	FA	TGC	FA	TGC	FA	TGC	FA	TGC	FA	TGC	FA	TGC	FA
2014														
2015														
2016	360	77/21%	21%	10%	21%	16%	3.43	3.32	1212	1165	1829	1764	26	25

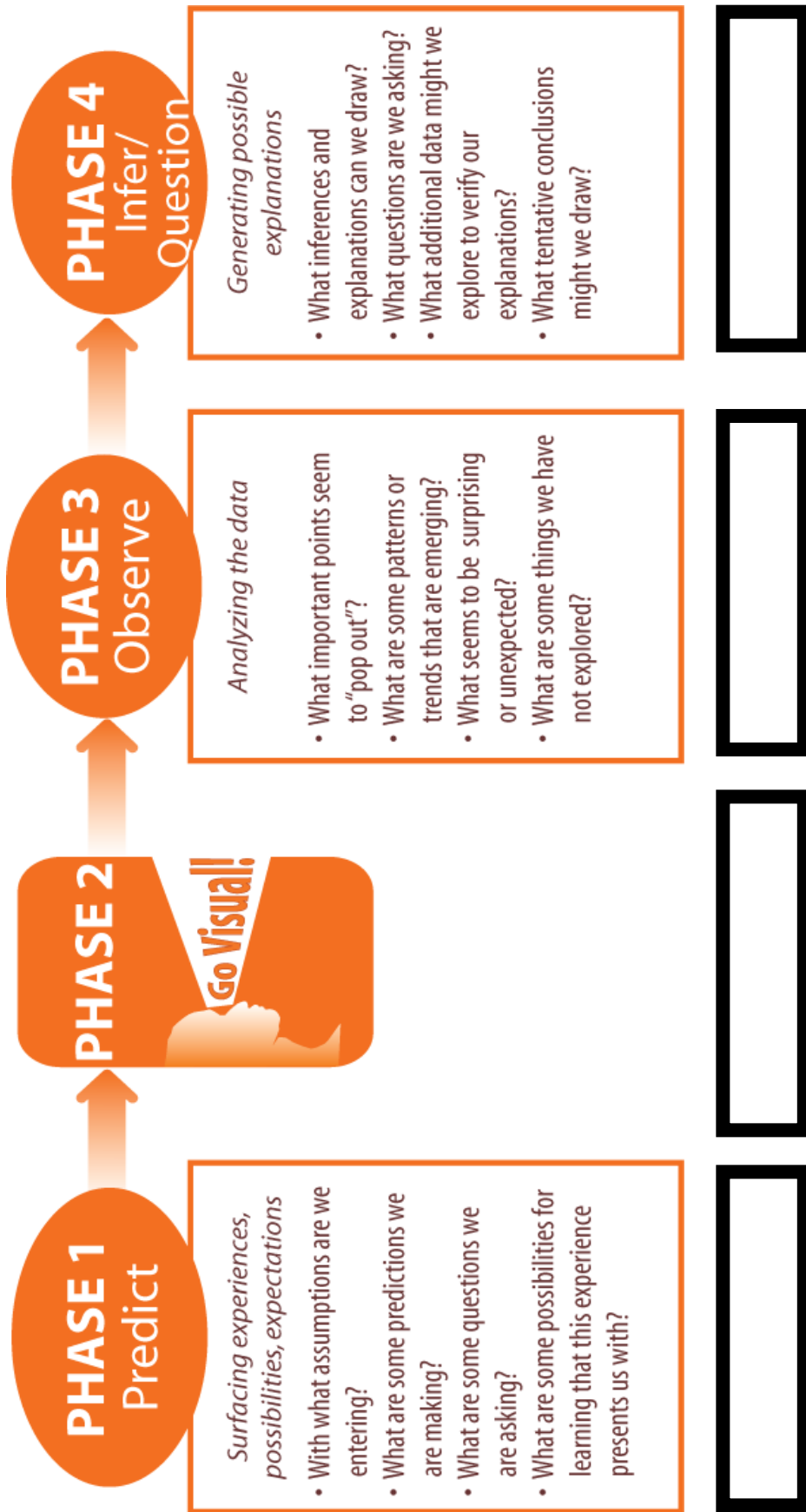
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SUMMATIVE DEMOGRAPHIC DATA – Graduating Class of 2016

	# grads	% grads	Grad w High Honor	Mean GPA	Mean SAT (1600)	Mean SAT (2400)	Mean ACT Readiness for College
TURM	71	20%	20%	3.42	1159	1747	25
LD	48	13%	4%	3.07	1162	1735	25
MAGIS	56	15%	14%	3.29	1136	1702	22
FA	77	21%	10%	3.32	1165	1764	25
TOTAL	360	100%	21%	3.43	1130	1829	26



Data Driven Partners



Adapted from B. Wellman and L. Lipton. *Data-Driven Dialogue: A Facilitator's Guide to Collaborative Inquiry*, Sherman, CT: MiraVia LLC, 2004

From N. Love, K. Stiles, S. Mundry & K. DiRanna, *A Data Coach's Guide to Improving Learning for All Students: Unleashing the Power of Collaborative Inquiry*, Thousand Oaks, CA: Corwin Press, 2008. All rights reserved.

