SCIENCE Formative Assessment

75 Practical Strategies for Linking Assessment, Instruction, and Learning

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A Joint Publication
#7: COMMIT AND TOSS

Description

Commit and Toss is an anonymous technique used to get a quick read on the different ideas students have in the class. It provides a safe, fun, and engaging way for all students to make their ideas known to the teacher and the class without individual students being identified as having “wild” or incorrect ideas. Students are given a question. After completing the question, students crumple their paper up into a ball and, upon a signal from the teacher, toss the paper balls around the room until the teacher tells them to stop and pick up or hold on to one paper. Students take the paper they end up with and share the ideas and thinking that are described on their “caught” paper, not their own ideas.

How This FACT Promotes Student Learning

Commit and Toss incorporates an essential component of conceptual-change teaching and learning—committing to an outcome based on students’ own ideas. Before students crumple and toss their papers, they must think about the question posed, commit to a response, and describe their thinking. This FACT helps students recognize that it is common for students in a class to have different ideas. There is a sense of relief when a student realizes that he or she is not alone in his or her answer. It helps students see that “wrong” answers can be just as valuable for building learning opportunities and constructing new ideas as “right” answers. It provides a non-threatening opportunity to make everyone’s ideas public regardless of whether they are right or wrong. It allows students to tap into others’ thinking, comparing their own ideas with others’ in the class. Since the technique is anonymous, individual students are more likely to reveal their own ideas rather than providing a “safe” answer they think the teacher wants to hear.

How This FACT Informs Instruction

Commit and Toss allows the teacher to get a quick read on ideas and explanations that are prevalent in the class. It is a very engaging way to get
a class snapshot of student thinking. The information is used to design and provide targeted learning opportunities for conceptual change, including an opportunity for students to test their ideas or gather more information that will support or modify their thinking.

Design and Administration

Choose a content goal. Design or select a forced-choice assessment item that requires students to commit to an outcome and provide a justification for the answer they selected, such as the example in Figure 4.4.

Remind students not to write their names on their paper. Give students time to think about and record their response, encouraging them to explain their ideas as best they can so another student would understand their thinking. When everyone is ready, give the cue to crumple their paper into a ball, stand up, and toss it back and forth to other students. Students keep tossing and catching until the teacher says to stop. Make sure all students have a paper. Remind students that the paper they have in their hand will be the one they talk about, not the answer and explanation they wrote on their own paper.

After students catch a paper, give them time to read the response and try to “get into the other student’s head” by making sense of what the student was thinking. Ask for a show of hands or use the Four Corners strategy to visually show the number of students who selected a particular response. Have students get into small groups according to the selected response on their paper and discuss the similarities or differences in the explanations provided for each choice and report out to the class the different explanations students provided for each answer choice. The teacher can list the ideas mentioned, avoiding passing any judgments, while

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**Figure 4.4  Example of a Forced-Choice Question Used With Commit and Toss**

<table>
<thead>
<tr>
<th>Sophie's Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sophie stood with both feet on the bathroom scale. She recorded her weight. She lifted her left foot and stood on the scale with only one foot on it. Which best describes what happened to the reading on the scale?</td>
</tr>
<tr>
<td>A. The weight shown on the scale increased.</td>
</tr>
<tr>
<td>B. The weight shown on the scale decreased.</td>
</tr>
<tr>
<td>C. The weight shown on the scale stayed the same.</td>
</tr>
</tbody>
</table>

Explain your thinking. Describe the reason for the answer you selected.
noting the different ideas students have that will inform the instructional opportunities that will follow.

Once all the ideas have been made public and discussed, engage students in a class discussion to decide which ideas they believe are most plausible and to provide justification for their thinking. This is the time when they can share their own ideas. Following an opportunity to examine the class’s thinking, ask for a show of hands indicating how many students modified or completely changed their ideas. Also ask how many students are sticking to their original idea. With consensus from the class, select a few of the common ideas and have students decide in small groups or as a class how to go about investigating the question in order to determine the correct scientific explanation. Provide opportunities for students to test or use other resources to research their ideas. Revisit these ideas again during the formal concept-development stage to help students build a bridge between their ideas and the scientific explanation. Ask students to consider what else it would take to convince them of the scientific explanation if they are still experiencing a dissonance between their ideas and the scientific ones. See the Appendix for sources of assessment probes that can be used with this strategy.

General Implementation Attributes

Ease of Use: High
Cognitive Demand: Medium
Time Demand: Low

Modifications

This FACT can be modified to fit a less rambunctious situation by adapting it to a “commit, fold, and pass” where students fold their paper in half and pass it around the room until the teacher gives the signal to stop passing.

Caveats

This is a fun, engaging technique—for this reason, be careful not to overuse it or it will lose its effectiveness. Remind students to honor anonymity, even if they recognize someone’s handwriting. It is also important to establish the norm that disparaging or other types of negative comments should never be made about the student paper they end up with.

Use With Other Disciplines

This FACT can also be used in mathematics, social studies, language arts, health, foreign languages, and performing arts.
#8: CONCEPT CARD MAPPING

Description

*Concept Card Mapping* is a variation on the familiar strategy of concept mapping (Novak, 1998). Instead of constructing their own concept maps from scratch, students are given cards with the concepts written on them. They move the cards around and arrange them as a connected web of knowledge. They create linkages between the concept cards that describe the relationship between concepts. Moving the cards provides an opportunity for students to explore and think about different linkages.

How This FACT Promotes Student Learning

*Concept Card Mapping* provides an opportunity for students to activate their prior knowledge, think about the relationships between familiar concepts, and make a visual representation of the connections in their own knowledge network. When students create maps collaboratively in small groups, the maps promote discussion. Individuals become more aware of their own ideas and may modify them accordingly as a result of the discussion generated in their group. Because there is no one “right answer,” this FACT provides an open entry point for all learners. In the process of exploring their own and others’ ideas, they use that information to connect ideas and terminology together in a coherent way, deepening their understanding of the structure of a topic. Students who tend not to speak up in class have been found to contribute freely in the nonthreatening activity of mapmaking (White & Gunstone, 1992).

How This FACT Informs Instruction

Teachers can use *Concept Card Mapping* as an elicitation prior to instruction or at key points in a sequence of lessons to gather information about how students make linkages among a connected set of concepts and terminology. Using a common set of predetermined words or phrases allows the teacher to see how different students, or groups of students, make conceptual sense of the same ideas in different ways. The student-generated sentences are examined carefully by the teacher to reveal any conceptual misunderstandings or incorrect ideas. The linkages made by students