

ASSESSMENT

Formative Assessments: You Have Options

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FORMATIVE ASSESSMENT PROVIDES US with powerful opportunities to enhance and improve classroom experiences. Using what we know about students' learning through formative assessment can provide us with meaningful information about what they know, can do, and understand. As educators, we have the ability to empower our students every day in the classroom through active learning opportunities using formative assessment strategies.

Introducing Formative Assessment

Let's begin with a brief review of assessment in general. Assessment is frequently divided into three main categories: diagnostic, formative, and summative.

Diagnostic assessments typically occur prior to learning. They are used to determine a learner's prior knowledge and aptitude, and identify some characteristics such as strengths, weaknesses, knowledge gaps, and appropriate course level placement.

Formative assessments (FA) occur throughout the learning process and do not cause interruption to it. They serve as a tool to improve the quality of student learning and inform essential curriculum modifications. Formative assessments typically do not involve a grade or have a point value, are non-threatening in nature, and provide students with timely feedback. In addition, they have the power to provide feedback to the teacher about student understanding prior to any high stakes assessment.

Summative assessments are used to check the level of learning at the end of a lesson, unit, or course. These assessments are a formal measure of student learning and are relative to predetermined learning outcomes in the course. Summative assessments are often comprehensive in nature and carry a higher weight in the course. They are used

to provide accountability at the end of a unit and, in mathematics courses, are frequently an exam.

For the purposes of this article, I will focus solely on formative assessment, highlighting ways of examining how students can improve the focus and depth of their conceptual understanding in our classrooms, thus improving student learning.

Formative Assessment for your classroom

Formative assessment can occur spontaneously, or it can be deliberately planned.

During a lesson a teacher may hear misconceptions that lead to a teachable moment. FA can also be intentionally designed to (1) elicit student thinking during the course of instruction in such a way that students uncover big ideas surrounding a concept, or (2) be embedded into the curriculum to solicit feedback at key points and highlight essential elements to provide deeper conceptual development. But whatever you do, focus your efforts on:

- Assessing prior knowledge and new learnings to plan instruction,
- Examining student work,
- Probing student thinking, and
- Providing appropriate feedback.

Prior Knowledge

Fundamental to any instruction is an awareness of what each student already knows and understands. The ultimate goal of any lesson is to deepen the students' knowledge and understanding of this concept—along with making connections to new material.

- Prior to starting your lesson for the day, consider the standard(s) you are addressing and determine what your students already know about the content in the lesson.

- Ask a variety of questions in order to understand the depth or absence of knowledge on the topic being taught. These questions can help determine how much students already know, what they understand, and what they are able to do with the material. The questions should be brief and take no more than 5 to 10 minutes depending on the length of your class period. They could be completed on a note card, at the board, or as part of a small group discussion.

Assessing Learning (so far)

Prior to students leaving class for the day, it is essential to assess learning, and this can be done without having to grade endless amounts of homework sets. Gallery Walks, Observation Protocols, and Round Robin activities all provide opportunities to do so.

Gallery Walks are a forum in which students rotate through a series of stations to demonstrate a level of mastery by posting a comment, a strategy, a question, or a solution. Critical thinking, written expression, and oral communication are all critical components. As a formative assessment, gallery walks may take an entire class period, can persist through a unit, or last only 10–15 minutes. Consider ways in which students share their work to help create a community of learners. To integrate a Gallery Walk into a lesson, first divide students into small groups and observe students as they discuss their work. Around the room, post a series of questions which require students to predict possible approaches to problems, analyze solution approaches, compare and contrast possible correct approaches to problems, and justify their thinking while making connections to previous mathematical experiences—all which require higher cognitive loads. All small groups should also address questions from other groups in the class. In doing so, each group can make connections between their group and the other groups' work.

Observation Protocols provide a format for evidence of student progress and inform instructional modifications or revisions based on this progress. Their focus depends on the intent of the particular activity. For example, students are working on a problem solving activity which requires they share

their strategies, communicate their work both orally and symbolically, justify their answers both orally and in written form, and finally report their findings as a group to the class. A protocol can be designed to record each student's level of competence in each area, in addition to when a student gets frustrated and gives up.

Round Robin Activities incorporate each student's work (turn) into a group solution. The key is that individual student work is still visible. This can be very beneficial as it makes the teacher aware of each student's struggles and misconceptions. These types of activities are designed to allow the teacher to assess each student as he or she works, intervene if necessary to address misconceptions or gaps in each student's understanding, and provide the student with immediate feedback.

Here is one example of how to use a Round Robin activity.

- Six problems related to a certain concept are written on the board (I have six whiteboards in my classroom). All students write down all six problems to work out again on their own, later.
- Six students are asked to come to the boards with one student per problem. Each student works the first step of the problem. The rest of the class can be assigned a certain problem and asked to work on it while these students are at the board, or simply watch what these students are doing.
- Students at the boards then rotate whichever direction the teacher indicates to a new problem. The students now work the second step to this problem.
- Students rotate in the same direction to a new problem and work the third step of this new problem.
- This continues until the problem is solved.
- Have students at the board discuss any errors, corrections, and misconceptions. Then ask students who are not at the board for additional comments or questions.
- Erase the board and write six new problems.

Have six students work these problems in the same fashion until all students in the class have been at the board.

- Some tips...
 - Try to use six different colors of markers so it is easy to tell which students are working.
 - If the previous student makes a mistake, do not erase. Circle the entire line of work, move below and do the correct work. This will be the work for that rotation.



Student thinking can also be formatively assessed with questioning and discourse strategies.

Probing Student Thinking

Take a moment and think about how you ask students questions during your classes. Do you engage all of the students, or are you having a conversation with a single student? Many times we call on only one student or pose a question, then wait for one or two (frequently the same students) to answer. These individual conversations allow other students in the class to disengage while one student and the teacher discuss the individual's response. Other approaches that can be used, and that you may already employ, requires active listening:

Focused Questions (specifically using Think-Pair-Share). First pose a question to the entire class. Have each student write down his or her thoughts, ideas, and/or work depending on the type of question posed. Be sure to allow enough time for students to compose an appropriate response. Then have students pair up to compare and share. This type of sharing is often called a Think-Pair-Share. Students

can remain in pairs and share their thoughts with the class or broaden the dialogue by having students move into groups of four and then report out.

Hinge Questions are similar in nature, but depend on what students may be doing or saying while they are working in pairs, small groups, or individually. There are three forms of Hinge Questions to consider depending on your lesson: engaging, refocusing, or clarifying. As a lesson or activity unfolds, we often know where students are going to have difficulties. In preparing the lesson or activity, it will be helpful to

have a series of relevant questions ready to ask students should they require assistance with engaging, refocusing, or clarifying with respect to the lesson or activity. Keep in mind the best questions require deep thinking, meaningful connections, and taking advantage of those teachable moments.

- *Engaging Questions* - When we begin any lesson or activity, we often have a series of basic questions to get students started.

These questions direct students on the path needed to appropriately dissect a problem. Once we ask these types of questions and know that students understand the task at hand, we can then engage them further by asking questions that require examination of the problem in more detail, ask for individual contributions and group summaries, and produce results which support students' conceptual understanding—in addition to providing details about students' procedural approach. This questioning is the heart of formative assessment, assessing student understanding to properly adjust instruction.

- *Refocusing Questions* - How many times have you watched a student choose an approach to solving a problem that you know is incorrect? Often we want to “save” them the time and trouble so we intervene too soon. We must further our assessment of student understanding—even as they struggle to maintain lesson focus. When students drift off and discover they have chosen the wrong path, guide them

to a new path using refocusing questions. One question may not be enough, so be prepared with a series of questions that will refocus students that are off course—without just telling them what to do and how to do it. This formative assessment strategy will afford you knowledge of student understanding so that you can adjust instruction in the moment.

- *Clarifying Questions* - What teachers say and what students hear are not always the same thing. Clarifying questions can be used in many forms. The most basic version of a clarifying question is asking a student to repeat directions or to summarize an assignment. A more in-depth version of a clarifying question is to have students explain what they are thinking, either verbally or in a written format. Teachers can then experience a deeper look into student thinking about a concept.

Mathematical Discourse

Students of all ages are asked to communicate mathematics. To communicate what they know, students must also make connections. *Principles and Standards for School Mathematics*, published by NCTM in 2000, outlined the essential components of a high-quality school mathematics program, including Process Standards for Communication, Connections, and Reasoning and Proof. Probing student thinking via mathematical discourse makes use of these foundational elements.

Facilitating effective dialogue in the classroom can be a challenge. It falls on the teacher to ensure that classroom discussions focus on involving all students at a high level of cognitive demand with a focus on knowledge and reasoning about mathematical evidence, in order to achieve meaningful mathematical discourse. To achieve such a state, teachers of mathematics should pose questions that invite, engage, and challenge students' thinking while listening carefully to students' ideas and thoughts. Reflective listening statements and oral summaries will encourage more students to add to and redefine previous students' statements. To achieve deep and meaningful discourse, teachers must ask students to clarify and justify their thinking through multiple approaches and in both orally and written formats. Determin-

ing the depth of a discussion on a particular concept should be based on students' contributions during a discussion. Teachers must be attentive to include appropriate notation and structure as concepts are explored. Finally, it is essential to orchestrate successful discourse to determine when to provide information—rather than let students discover it on their own—when to correct or clarify misconceptions, and when to model or to lead—instead of letting students struggle to clarify something on their own.



Using assessment to plan instruction utilizes assessing prior knowledge, assessing students' work, and probing students' thinking. It also requires sharing feedback with students. Feedback can be given in a variety of forms, but its intent and approach should be examined prior to doing so.

Written Feedback

When returning student work, what do students look for on their papers? Are they looking for feedback or a grade? If the grade is good, students will typically keep that paper. If the grade is poor, what do students do with it? While they should keep it and determine where and why their errors were made, typically the paper with the poor grade is thrown away.

Consider this...Does every paper need a grade or can feedback be provided in such a manner as to promote a focus on the learning, rather than the grade? If written feedback is given in place of a grade, stu-

dents will read the feedback and give more serious consideration to what is being said. To have a more positive impact on student learning, more informative and less judgmental feedback needs to be provided.

Of the feedback that can be given, we must consider the type that best addresses the outcomes we seek:

Motivational feedback helps learners feel that their work is recognized, allows learners to know they are making progress, and encourages and supports them.

Evaluative feedback measures student achievement through a grade or with a score, and summarizes achievement.

Descriptive feedback gives information about the work—not the student—in a neutral timely manner, is constructive in nature, and is based on accurate standards for performance.

Effective feedback moves a student's understanding forward, provides the necessary support for cognitive connections and internalization of approaches to learning, allows learners to move their reasoning to a higher level but at their own pace, places the focus on mastery and may allow student to revise or redo work, and encourages self-reflection and metacognition. In planning your instruction, also plan your approach to giving feedback. The type of feedback given may impact how students approach and engage with an activity or lesson. Do they feel supported and encouraged through the learning process? Do they understand productive struggle is a foundational part of deep and meaningful learning?



Conclusion

Incorporating formative assessment strategies in the classroom can provide educators with a significant amount of information to both improve and enhance student learning. However, it is crucial to be both purposeful and intentional in your choice of assessment. Be cautious about overwhelming yourself and your students with new approaches. It takes time to seamlessly integrate new assessment strategies into your lessons. A suggested approach to expanding one's formative assessment repertoire would be to choose one new formative assessment. Add it to your educational practice to inform and improve student learning. Perfect it, and then incorporate another.