

## Author Monographs

# Developing Learning Targets

## Defining Formative Assessment

Classrooms in which teachers and students engage in the process of formative assessment are ones in which teachers are explicit about expectations for learning, and both teachers and students monitor students' work in terms of progress toward those expectations. The shared element of reflecting on students' understanding in the context of clearly identified goals helps students learn to monitor their progress, receive feedback intended to promote further learning, and incorporate the feedback into subsequent work.

Learning targets serve as the foundational critical aspect. In this paper, Cheryl Rose Tobey will provide an overview for implementing learning targets in the mathematics classroom.

Teachers can help students learn to monitor and adjust their learning by helping them address the following three questions (Sadler, 1989, Hattie & Timperley, 2007; William & Thompson, 2007) throughout the formative assessment process:

- 1) What goal am I aiming for?
- 2) Where am I currently in relation to that goal?
- 3) If I have not yet met the goal, what do I need to do next to be able to meet it?

These are questions that even the youngest students can practice asking and answering with appropriate scaffolding. In doing so, teachers help students develop the focus and discipline needed to monitor and adjust their work to become self-regulating learners.

### Overview of learning targets as the foundational aspect

Introducing students to the learning target and revisiting this target throughout a core set of learning activities (a lesson) is foundational to the formative assessment process. Since the learning target defines the learning "destination" for students, sharing the learning intention and success criteria at the start of a lesson is like starting a trip with the destination clearly in mind. Students who have a clear sense of what they're supposed to be learning are often more willing to engage in the lesson.



by Cheryl Rose Tobey

**Senior Mathematics Associate at  
Education Development Center (EDC)**

Cheryl Rose Tobey is the project director for "Formative Assessment in the Mathematics Classroom: Engaging Teachers and Students" and a mathematics specialist for "Differentiated Professional Development: Building Mathematics Knowledge for Teaching Struggling Students." Both of these project areas are funded by the National Science Foundation. She is also a director of development for an Institute for Educational Science project. Her work, including published books, is primarily in the areas of formative assessment and professional development.

A learning target has two components: the statement of the mathematical idea and success criteria. The statement of the mathematical idea, or more simply “the math idea,” describes the conceptual learning that will result from the lesson. The success criteria describe the indicators that both teachers and students will use to gauge how well students understand the mathematical idea. The success criteria include a balance of procedural skills and higher level process skills that would provide evidence that a student is on track to meeting the learning target.

Since a lesson typically occurs over one to three class periods, the mathematical idea must be at the appropriate grain size to be reachable by the students in that period of time. There are many different structures of learning targets containing collections of math ideas and success criteria. Several of these structures are shown as examples below.

### Today’s Question:

How are sine and cosine related?

### Today’s Success Criteria:

- 1: Can I find the sine of an angle from the cosine of the angle?
- 2: Can I show or explain how the sine changes when the cosine changes, and vice versa?

### Target Understanding:

Variables can take on multiple values when used in an algebraic expression.

### How will I show I met the target understanding?

- 1: I can explain why an expression might have different values.
- 2: I can substitute different numbers into an expression to give it different values.

### Today’s Math Idea:

What is the difference between common factors and common multiples?

### Criteria for Success:

- 1: I can find the common factors of two numbers.
- 2: I can find common multiples of two numbers.
- 3: I can explain the difference between a common factor and a common multiple.

### What I will learn:

“Counting on” is a strategy for adding numbers.

### I know I learned it if:

- 1: I can solve addition problems using counting on.
- 2: I can show someone else how the counting on strategy works.

Introducing and revisiting the learning target at several points during instruction helps students use it to support their learning. The points during instruction to introduce and revisit the learning target include:

#### ■ When first introducing the target

Students who have a clearer sense of what they’re supposed to be learning are often more willing to engage in the lesson. Using a strategy such as “think, pair, share,” gives students a few moments to think about what the learning target means (the share will give you an opportunity to clarify as needed.) Although learning targets are often introduced at the beginning of the lesson, introducing them later, after an initial investigation period, is also a strategy that can be used successfully. Students should understand ahead of time that the learning target will be shared after the investigation.

#### ■ While instruction is underway

Teachers should pause at least once in the middle of a lesson for a brief opportunity to revisit and clarify the learning target. Oftentimes, the learning target will make more sense to students once they have done some of the lesson’s activities. This strategy provides a much-needed opportunity for students to summarize their learning to that point (“What do we know so far in relation to our learning target?”). You can also use it to refocus learning (“How does the activity we just did relate to our learning target?”), or to further clarify the learning target (“Remember, the learning target is about comparing fractions. By this, we mean...”). Formative assessment guru Dylan Wiliam notes that revisiting (refocusing on) the learning target is particularly beneficial to struggling students.

Students who are not performing well may often have difficulty pinpointing the important learning in a lesson. These students think they are required to do more than they actually are because they struggle to prioritize the many different mathematics ideas or skills that arise during a lesson. As a result, they may end up doing more work, or just different work, than is desired. (Wiliam, 2011)

#### ■ Towards the end of an instructional period

A quick revisit of the learning target at the end of the math class or at the end of the lesson can serve as a valuable way to summarize how the lesson’s activities relate to the learning target. This explicit connection between the lesson’s activities and the learning target can help students connect their experiences to the important learning idea stated in the target, solidifying or reinforcing the idea in students’ minds.

## Background Information: How learning targets are being talked about in the field

Although experts agree that sharing and revisiting learning targets is a foundational element to the formative assessment process, definitions and characteristics of learning targets vary. The information that follows in Table 2 shows some of the variation in ways learning targets are being described in the field. In some bodies of work, the phrases “learning target” and “success criteria” are used together and in others only the term “learning target” is used.

**Table 2: Summary of Definitions and Characteristics from the Field**

### Learning Targets, Moss and Brookhart, ASCD, 2012

#### Learning Targets:

- Guide learning
- Language that students understand
- Describe lesson-sized chunks of information and skills and reasoning processes that students will come to know deeply
- Shared throughout the lesson so students can use them to guide their own learning
- Use words, pictures, actions, or some combination of the three to express to students the content and performance they are aiming for

#### Criteria for Success:

- Applied during the performance of understanding
- A set of student “look-fors”
- Answer “How will I know I reached the target?”
- Specific to the learning target
- Understandable
- Visible
- Lesson-sized
- Observable, measureable
- Student point of view

#### Learning Target Example (p.166):

- I am going to be able to use a method called “carrying” so that I know what to do with the 10 under 8+2 or the 12 under 9+3 in problems like these: 438+152; 219+363

#### Criteria for Success:

- I can explain and show how to put the carrying marks in the right places as I solve problems

### Formative Assessment, Heritage, Corwin, 2010

#### Learning Goals:

- Derived from learning progression
- Identifies what students will learn during the course of the lesson or lessons
- The drivers of Formative Assessment

#### Criteria for Success:

- Identifies what it takes to meet the learning goal
- Used as checks on learning
- Guide to learning while the student is engaged in the learning tasks

#### Learning Goals:

- Understand that a unit of measure is proportional to its whole (e.g. a centimeter is a proportion of a meter)
- Understand any unit of measure can be divided into any number of equal subunits

#### Success Criteria:

- Compare parts of a whole to identify the fractional relationship
- On a number line from 0-12, accurately determine the fractional parts from 1/2 of a segment to 1/12 of the segment
- Explain why on a number line whole numbers increase from left to right but fractional denominators decrease from left to right

**Chappius and Stiggins, Assessment Training Institute, Pearson****Learning Targets:**

- Centered on the truly important learnings of the field of study
- Integrated with learning progressions
- Created within the developmental reach of the students who are to master them
- Designed to be manageable given the teacher's available resources and students' ability to learn
- Various types of targets including knowledge, factual, conceptual, and reasoning
- Vary in complexity, clarity, and level of specificity

**Knowledge Examples (p. 46):**

- Recognize acute, obtuse, and right angles
- Knows the remainder theorem for polynomial division

**Reasoning Examples (p.51):**

- Identifies shapes as two-dimensional or three-dimensional
- Uses data from a random sample to draw inferences about a population with an unknown characteristic of interest

**Embedded Formative Assessment, Wiliam and Leahy, Solution Tree, 2011 and 2015****Learning Intentions:**

- What the teacher expects the students to learn as the result of an activity/lesson
- The specific need aligns with the learning/instruction involved
- Should be separated from the context of the learning

**Criteria for Success:**

- Outcomes of learning—what students are expected to be able to do
- Criteria can be task-specific or generic scoring rubrics
- Product-focused or process-focused criteria
- Can be official or student-friendly language of interest

**Learning Objective Example (p. 35, 2011):**

- To construct and analyze questionnaire data

There are no mathematics example learning intention and success criteria sets in the 2011 or 2015 resource.

**National Council of Teachers of Mathematics (NCTM), Principles to Action, 2014****Learning Goals:**

- Goals should describe what mathematical concepts, ideas, or methods students will understand more deeply as a result of instruction
- Are linked to the current classroom curriculum and student learning needs, referring, for example, to particular visual representations or mathematical concepts and methods that students will come to understand as a result of instruction

**Both teachers and students need to be able to answer crucial questions:**

- What mathematics is being learned?
- Why is it important?
- How does it relate to what has already been learned?
- Where are these mathematical ideas going?

**Learning Goals Example (p. 15 within vignette):**

- Represent and solve problems using diagrams or object and equations
- Explain what each number means in a problem
- Compare how problem situations are similar or different
- Explain how the underlying structure in a problem relates to addition and subtraction

Although much is being said about what learning targets are, few expert examples for mathematics are being provided in these resources. One example from each resource is provided above, but few additional math-specific learning targets are included, ranging from zero complete sets in Wiliam’s “Embedded Formative Assessment” resources to five examples in Heritage’s “Formative Assessment” resource. There is even less content support available for learning how to develop learning targets specifically in mathematics.

**Digging Deeper: Defining the components of a two-part learning target**

As stated previously, a learning target has two components: the statement of the mathematical idea and the success criteria. The statement of the mathematical idea, or more simply “the math idea,” describes the conceptual learning that will result from the lesson. The success criteria describe the indicators that both teachers and students will use to gauge how well students understand the mathematical idea. These kinds of learning targets are designed to support all the other formative assessment practices, including: eliciting and interpreting evidence of students’ learning, choosing an appropriate responsive action, and providing effective feedback that students learn from. And most of all, they are designed to be a tool that students can use to guide their learning.

Many state frameworks include an emphasis on conceptual understanding, and the Common Core State Standards have articulated conceptual understandings explicitly in their various content standards, several examples of which are listed below.

- (Gr 3): Interpret whole-number quotients of whole numbers, e.g., interpret  $56 \div 8$  as the number of objects in each share when 56 objects are partitioned equally into 8 shares, or as a number of shares when 56 objects are partitioned into equal shares of 8 objects each. For example, describe a context in which a number of shares or a number of groups can be expressed as  $56 \div 8$ .
- (Gr 5): Generate two numerical patterns using two given rules. Identify apparent relationships between corresponding terms. Form ordered pairs consisting of corresponding terms from the two patterns, and graph the ordered pairs on a coordinate plane. For example, given the rule “Add 3” and the starting number 0, and given the rule “Add 6” and the starting number 0, generate terms in the resulting sequences, and observe that the terms in one sequence are twice the corresponding terms in the other sequence. Explain informally why this is so.

- (Gr 7): Understand that multiplication is extended from fractions to rational numbers by requiring that operations continue to satisfy the properties of operations, particularly the distributive property, leading to products such as  $(-1)(-1) = 1$  and the rules for multiplying signed numbers. Interpret products of rational numbers by describing real-world contexts.

Each of these standards points to a sophisticated understanding of content that goes beyond being able to master certain skills accurately. Recall that the math idea component of a learning target is a mathematics concept, not simply a math skill or procedure. The focus here is on what the student will understand by the end of a lesson, not only about what he or she will be able to do. Articulating the math idea helps teachers unpack such understandings from the standards into concepts that can be addressed at the lesson level.

Thinking about learning targets in this way is often a shift in practice for teachers. While all teachers want their students to develop rich conceptual understanding, they are not always explicit about what that learning looks like or sounds like. Particularly in mathematics, it’s easy to focus more exclusively on teaching procedures and assuming that the underlying conceptual understanding will develop as well; this is akin to focusing on spelling and grammar rules in a writing class and hoping that students will just learn how to compose thoughtful, well-written pieces. Two-part learning targets help make the learning of this underlying understanding more explicit to students, yet, with little or no support from their materials for articulating this underlying learning, writing these targets can be challenging for teachers.

**Table 3: Learning Target Example - Before and After**

Before Support	After Support
<p><b>Math learning objective:</b></p> <ul style="list-style-type: none"> <li>■ Students will be able to multiply multi-digit whole numbers using arrays</li> </ul>	<p><b>Math idea we’re learning about:</b></p> <ul style="list-style-type: none"> <li>■ Arrays can be used to represent multiplication</li> </ul> <p><b>I will know that I’ve learned this idea if:</b></p> <ul style="list-style-type: none"> <li>■ I can create an array for a multiplication problem</li> <li>■ I can describe how the array represents multiplication</li> </ul>

**Table 4: Examples, Skills, and Processes**

Procedurally Focused	Analytically Focused
<ul style="list-style-type: none"> <li>▪ Calculate an answer</li> <li>▪ Follow a procedure</li> <li>▪ Solve a problem</li> <li>▪ Define a term</li> <li>▪ Explain “how to”</li> </ul>	<ul style="list-style-type: none"> <li>▪ Explain why</li> <li>▪ Use a model to justify</li> <li>▪ Prove something is true</li> <li>▪ Generalize across examples</li> <li>▪ Show or explain a relationship between two concepts</li> </ul>

Each math idea is accompanied by the next part of the learning target – a set of success criteria. The success criteria are several accompanying statements that support the math idea by giving both teachers and students some guidance on what to look for in students’ learning if they are working successfully toward understanding the important math idea. These success criteria describe what students will say, do, or produce if they understand the important math idea and are tangible and therefore observable.

An important purpose of the success criteria is to help students learn to answer for themselves the question: “Where am I currently in relation to those goals [the important math idea]?” Success criteria are what both the teacher and students will use to determine how fully the students understand the important math idea. This requires a couple of different kinds of evidence of their understanding. Sometimes students need to demonstrate that they can solve problems or correctly apply mathematical procedures. A success criterion that describes how students apply mathematical skills or procedures correctly asks students to draw on procedural thinking; therefore they are referred to as the procedurally focused success criteria. They focus on “doing something” in math. However, being able to solve a problem accurately or complete a procedure correctly is not sufficient evidence that a student understands the mathematics. It’s not uncommon for students to be able to produce a correct answer without any underlying understanding, or even by accident – arriving at the right answer but with faulty reasoning. So students also need to be able to let you know what they understand about the important math idea. This calls for a different kind of success criterion that asks a student to explain, justify, show, or describe what they understand. Because these kinds of success criteria ask students to use more analytical thinking skills, they are referred to as the analytically focused success criteria.

Table 4 provides examples of the typical types of skills and processes that fall under procedurally and analytically focused criteria. Note that “explain how to” is listed in the procedurally focused criteria.

### Writing Learning Targets: Supports for the development process

As noted previously, articulating the math idea helps teachers unpack such understandings from the standards into concepts that can be addressed at the lesson level. This is deceptively difficult to do. Over the course of multiple research-based grants, Creighton, Tobey, Karnowski, and Fagan found that teachers wanted structures and processes to support them throughout the development process.

Given that many teachers write learning targets from existing lessons within a program, the first process provides steps for developing targets from the lesson as a starting point. Others use a backwards planning process by first developing the learning targets and from there the lesson activities. Full descriptions can be found following the references on pages 5 and 6 and are summarized below in Table 5.

**Table 5: Summary of Development Steps**

Starting from a Lesson	Starting from a Content Standard
<b>STEP 1</b> <ul style="list-style-type: none"> <li>▪ Identify your lesson activities</li> </ul>	<b>STEP 1</b> <ul style="list-style-type: none"> <li>▪ Identify the content standard</li> </ul>
<b>STEP 2</b> <ul style="list-style-type: none"> <li>▪ Articulate the important math understanding that should result from those activities</li> </ul>	<b>STEP 2</b> <ul style="list-style-type: none"> <li>▪ Narrow your focus within the standard</li> </ul>
<b>STEP 3</b> <ul style="list-style-type: none"> <li>▪ Come up with two to three success criteria that will be the “look-fors” during the lesson</li> </ul>	<b>STEP 3</b> <ul style="list-style-type: none"> <li>▪ Rephrase it as an important math idea for your students</li> </ul>
<b>STEP 4</b> <ul style="list-style-type: none"> <li>▪ Review your learning target against the characteristics</li> </ul>	<b>STEP 4</b> <ul style="list-style-type: none"> <li>▪ Come up with two to three success criteria that will be the “looked-for” during the lesson</li> </ul>
	<b>STEP 5</b> <ul style="list-style-type: none"> <li>▪ Review your learning target against the characteristics</li> </ul>

Another important resource for supporting teachers' development of learning targets is an extensive database of examples. Having multiple grade-level examples across each of the domains in mathematics gives teachers examples to build from and adapt in order to fit the language expectations of the standards or program in use.

Regardless of the starting point, the development process ends with checking the learning target against a set of characteristics and guiding questions (see Table 6). These guidelines have also served as peer review criteria as teachers work together to develop and refine learning targets.

### Recap: Defining learning targets in mathematics

Learning targets are foundational to implementing other aspects of formative assessment. A learning target includes two components, the mathematics idea and the success criteria.

- The mathematics idea articulates the key understanding that a student will gain in a lesson. This understanding is focused at a lesson-level rather than at the broader level of a Common Core Standard. A series of related learning targets together can help students meet a Common Core Standard.

- The success criteria are a set of “look-fors” that both teachers and students can use to determine the extent to which the students are learning the mathematics idea.
- Procedurally focused criteria describe skills or procedures that students can complete successfully.
- Analytically focused success criteria describe evidence of conceptual understanding by asking students to generalize, justify, relate, or compare concepts through an explanation or model.

Any learning target can be the basis for a lesson that incorporates use of the standards for mathematical practice; the practices emerge in the way students engage with the content, rather than through particular content. However, learning targets may point more specifically to one—or several—of the “Standards for Mathematical Practice.”

## Table 6: Characteristics and Guiding Questions for Reviewing Learning Targets

### Characteristics of Two-Part Learning Targets

A two-part learning target consists of a statement of a mathematics idea to be learned during the lesson and an accompanying success criteria.

The statement of the mathematical idea focuses on the learning, not the lesson activities.

The success criteria describe examples of something a student will be able to say, do, or produce if the learning is on track toward reaching the learning intention. They are tangible and observable.

A learning target should include at least one of each of the following kinds of success criteria:

- **Procedurally focused success criteria** describe skills or procedures that students can complete successfully
- **Analytically focused success criteria** describe evidence of conceptual understanding by asking students to generalize, justify, or compare concepts through an explanation or model

A single learning target will rarely include more than two or three success criteria. The order in which they are listed does not matter.

### Check Your Learning Target – Ask Yourself:

Is the mathematics idea focused on the important mathematics learning in the lesson rather than referring to activities or tasks that students will complete? What is it that students need to understand as a result of doing the lesson activities?

Is each of the success criteria something you can use as tangible evidence (can review, hear, see, etc.)?

Does at least one of the success criteria describe something students can do or explain how to do? (Procedurally Focused Success Criteria)

Does at least one of the success criteria describe something students can justify, model, or explain at higher conceptual level? (Analytically Focused Success Criteria)

How many success criteria do you have? If you have more than two to three, which ones are highest priorities for this lesson?

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