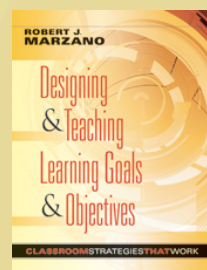




THE MAIN IDEA

current education book summaries



File: Instruction –
Learning Goals

Designing & Teaching Learning Goals & Objectives

By Robert J. Marzano (Marzano Research Laboratory – Powered by Solution Tree, 2009)

S.O.S. (A Summary Of the Summary)

The main ideas of the book are:

- Research strongly suggests that effective learning goals improve student achievement.
- By learning more specifically what makes goals effective and how to implement them in their own classrooms, teachers can improve their instruction.

Why I chose this book:

Dr. Marzano is at the forefront of educational research on best instructional and leadership strategies. Now he is creating a series of books, each of which describes *in detail* how to implement one of these research-backed strategies. I found that in this book, Marzano translates the research on learning goals into concrete suggestions for teaching and provides a practical tool accessible for all teachers in all grades. The book contains actual reproducible exercises teachers can use to apply their understanding of effective learning goals.

Leaders can consider implementing these learning goals school-wide to more dramatically impact the way teaching and learning occurs at their schools.

The Scoop (In this summary you will learn...)

✓ *What makes an effective learning goal, according to the research*

Learn what the research says about goal difficulty, specificity, mastery vs. performance goals, and noncognitive goals.

✓ *Ways to make learning goals more specific*

Strategies such as translating larger standards into specific goals and presenting assessment tasks along with goals help students better understand what teachers want them to learn.

✓ *How learning goals can help with differentiation*

By developing learning goals at different levels of difficulty, teachers can address the diverse needs of students.

✓ *How to create a scale or rubric*

Learn to create an assessment tool in which goals at different levels of complexity are organized into one scale.

✓ *How to organize learning goals into a year-long plan*

Look at an excerpt of a year-long plan and consider the issues involved in creating units around learning goals.

✓ *Concrete skills to implement learning goals*

There are excerpts of exercises in the summary (and full reproducibles and answers in the book and on the web) teachers can complete to better understand the different types of learning goals and to create their own.

✓ *How to help teachers plan backwards – from a year's worth of goals to the specifics of a first unit's goals*

See The Main Idea's Professional Development Suggestions at the end for workshop ideas to use with staff.

INTRODUCTION

Robert Marzano has devoted his efforts to presenting classroom strategies that not only work, but which are backed by the strongest research. These strategies have been introduced through his books such as *The Art and Science of Teaching*, *Classroom Management That Works*, and *Classroom Instruction That Works*. While these books covered individual strategies in each chapter, Marzano has created a new series of books – the *Classroom Strategies That Work* library – that will devote an *entire book* to one of these strategies. By having an entire book focus on one strategy, Marzano shows in more detail specifically how to implement the strategy. The first in the series, *Designing and Teaching Learning Goals and Objectives*, outlines the importance of creating effective classroom goals according to the research, and shows, step by step, how to create such goals.

Learning goals are instrumental to effective teaching. Without them, teaching would be unfocused and learning would occur by happenstance. Effective learning goals are a necessary ingredient in student achievement as is described by the compelling research outlined in Chapter 1.

Chapter 1: RESEARCH AND THEORY

Some people use the terms *goals* and *objectives* in different ways. This book uses the two terms interchangeably and the focus of the book is on daily classroom goals. Before 1949 educators did not focus as specifically on day-to-day learning objectives. Topics studied were broader – such as “probability” and “World War II.” However, the educational philosopher Ralph Tyler recommended that objectives contain a specific type of knowledge and refer to the kinds of behaviors that would show mastery of that knowledge. Since this time, there has been a great deal of research on goal setting – in both education and organizational psychology, too. The recommendations in this book are based on this strong research base.

While it may seem obvious that having clear learning goals is essential in boosting student learning, the research overwhelmingly backs this claim as well. There are over 30 studies listed in the tables summarizing this research on pp. 5, 10, and 11. From this research, there are important conclusions for classroom instruction. To understand this research on a deeper level, readers may want to look at Marzano’s explanation of the terms *meta-analysis* and *effect size* in Appendix B on p. 119. Overall, effect size reflects how powerful a strategy is, or how much the strategy will improve student achievement. Even a small effect size, like .4, means a student would improve by 16 percentile points.

Goal Difficulty and Specificity

To begin, two characteristics affect the effectiveness of goals: *goal specificity* and *goal difficulty*. Goals can be more specific (“Students will be able to list the Great Lakes”) or broader (“Students will be able to write a well-formed essay”). Goals also can range in their level of difficulty. Research strongly implies that goals are more effective when they are specific, and when students perceive them as difficult, but not too difficult. For example, one study found an effect size of .70 for goal specificity, which translates into a 26 percentile point gain and a study on goal difficulty found an average effect size of .82 for difficult versus easy goals (a 29 percentile point gain).

Mastery vs. Performance Goals

In addition to their specificity and difficulty, research also tells us that the effectiveness of goals depends on their purpose. Goals that require students achieve a certain score are *performance goals*. Goals that ask students to master content are called *mastery goals*. Below is an example of each:

Performance goal: Students will be determined proficient or higher in reading by the end of the school year.

Mastery goal: Students will be able to use word segmentation and syllables to decode an unrecognized word.

Studies have shown that *mastery goals* are more often associated with higher order learning and better performance. One study found an average effect size of .53 (a 20 percentile point gain) for mastery versus performance goals.

Cooperative Learning and Noncognitive Goals

While most of the research focuses on academic goals, there has been more attention to noncognitive goals recently. This research has shown that noncognitive goals – such as motivation, affect, behavior, self-concept and social skills -- also have an impact on student achievement and can be a viable instructional focus.

Cooperative learning, one type of noncognitive goal, has a thorough body of research. One set of impressive findings show an effect size of .78 in favor of cooperative learning over individual student tasks. While cooperative structures may focus on noncognitive goals, these cooperative goals are not established *in lieu* of academic or individual goals. Rather, cooperative goal structures help students accomplish their academic goals.

Providing Feedback

Feedback provides the information students need to help them reach their goals. One comprehensive review of the research shows that feedback is a powerful way to improve student achievement. Other research is mixed. Research shows that feedback that centers on the task, process, and self-regulation is often effective. However, feedback that focuses on the self (often delivered as praise) does *not* improve performance. Research on feedback is presented here because without effective goals, feedback is impossible. And without feedback, goals are essentially useless.

To give teachers a more concrete idea of what they can take away from this research, the following chapters will translate this research into more specific recommendations for creating effective goals and accompanying tasks for students in which they can demonstrate mastery of those goals.

Chapter 2: DEVELOPING *SPECIFIC* LEARNING GOALS AND TASKS

Learning Goals vs. Activities/Assignments

The research in the last chapter points to the importance of goal specificity. Specific goals impact student achievement more than general goals. The first step in creating specific learning goals is to understand the difference between *learning goals* and *activities/assignments* that are designed to help students meet those goals. In the examples below, the first two are assignments and the last two are learning goals:

1. Students will successfully complete the exercise in the back of chapter 3.
2. Students will create a metaphor representing the food pyramid.
3. Students will be able to determine subject/verb agreement in simple sentences.
4. Students will understand the defining characteristics of fables.

A learning goal states what the students will know or be able to do and often begins with “Students will be able to” and “Students will understand.” In the chart below the left column contains learning goals and the right one contains accompanying activities or assignments.

SUBJECT	LEARNING GOALS	ACTIVITIES/ASSIGNMENTS
Mathematics	Students will be able to solve equations with one variable.	Students will practice solving 10 equations in cooperative groups.
Social Studies	Students will understand the defining characteristics of the barter system.	Students will describe what the U.S. might be like if it were based on the barter system.

Declarative vs. Procedural Knowledge

To contribute further to your ability to create specific goals, it is also helpful to understand the distinction between goals that involve *declarative knowledge* and goals that involve *procedural knowledge*. These types of goals are addressed in more detail in Chapter 3. Briefly, *declarative knowledge* is information we want students to acquire while *procedural knowledge* includes the skills, strategies, and processes we want students to develop. In the table above, the mathematics goal is procedural while the social studies goal is declarative. While the format of these types of goals can vary, for the sake of simplicity, it is helpful to begin with these sentence starters to distinguish between the two:

(Declarative goal) Students will understand _____.

(Procedural goal) Students will be able to _____.

There are more nuances to these types of goals discussed in the next chapter. For example, one goal might be considered either declarative or procedural depending on what you want students to get out of the lesson. For example, for a goal involving decimals, if the teacher wants students to understand the characteristics of decimals (place values of numbers) then this is declarative. However, if the focus is on converting decimals to fractions, this is procedural. Another issue is that the word ‘understand’ is not very specific because it doesn’t outline *how* students are to demonstrate their understanding. More effective declarative goals use more specific verbs like *describe* or *explain*. However, then you may need to use the wording of procedural goals ‘will be able to’ as this declarative example shows: “Students will be able to explain the defining characteristics of the cell membrane.”

To begin to distinguish between these two goal types, below is an exercise that is excerpted from the book. Note that all exercises in the book: 1) appear as full page reproducibles you can use with teachers 2) can be printed out from marzanoresearch.com/classroomstrategiesthatwork and 3) contain answer keys. Here is the excerpt:

Exercise 2.2 DECLARATIVE vs. PROCEDURAL KNOWLEDGE (see p.16 for the complete exercise)			
For each statement about academic content, decide whether it is declarative, procedural, or either. Explain why.			
1. Creating a line graph to represent data	Declarative	Procedural	Either
2. Describing the events that led to the Cold War	Declarative	Procedural	Either
3. Determining breathing rate and heart rate	Declarative	Procedural	Either

Translating Larger Goals/Standards Into Specific Learning Goals

One challenge teachers face in creating specific learning goals is that they are often only given general academic goals such as state standards or district curriculum documents. The teachers must then translate these larger statements into more specific declarative and procedural learning goals. Below are some examples of broader goals on the left and how those goals might be translated into more explicit learning goals on the right.

BROADER LEARNING GOALS	SPECIFIC LEARNING GOALS
Understands the specific concept of a democracy	Students will be able to explain the basic defining characteristics of a democracy including the following: * Civic responsibility is exercised by voting, and power is exercised through elected representatives. * Majority is rule, and there is a focus on individual rights. * Governments exist at regional and local levels so they can be as accessible to the people as possible.
Understands and uses a variety of sentence types	Students will be able to produce examples of simple, compound, and complex sentences and write a brief essay that includes all three types.

Both of these examples show the necessity of the teacher inferring the content that is implied in the larger goal. In the second example it is implied that ‘sentence types’ refers to simple, compound, and complex sentences and ‘uses’ refers to use in writing, such as an essay. Below is an excerpt of an exercise to practice this translation. Again, the complete exercise and answer key is in the book.

Exercise 2.3 TRANSLATING GENERAL STATEMENTS INTO LEARNING GOALS (see p.18 for the complete exercise)
Translate the larger learning goals into specific learning goals that provide more guidance for the student and the teacher. 1. Language arts general statement: Speaking effectively More specific learning goal: 2. Mathematics general statement: Reducing fractions More specific learning goal: 3. Science general statement: Understanding photosynthesis More specific learning goal:

Designing Assessment Tasks to Accompany Learning Goals

To make learning goals even more specific, the teacher should design a task or tasks which will assess whether students have reached the learning goal. These tasks make the expectations for the students even more specific. Learning goals and assessment tasks are inextricably tied to a powerful framework of curriculum and assessment. Well-constructed learning goals make it easier to create well-constructed assessment tasks and well-constructed tasks help to make learning goals more concrete. Below are some examples of the types of tasks that might accompany learning goals. For practice, teachers can look at specific learning goals and come up with possible assessment tasks. To help teachers do this, an exercise providing sample learning goals is on p.20 of the book.

SUBJECT AREA	LEARNING GOAL	ASSESSMENT TASK
Language arts	Students will be able to use syllabication to sound out words.	Break the words below into syllables using the format provided, then put the syllables back together to sound out each word.
Math	Students will be able to find the volume of a cylinder given its circumference and height.	The cylinder in the drawing has a circumference of 42 cm and a height of 26 cm. Find the volume showing your work.

Chapter 3: DEVELOPING GOALS AT DIFFERENT LEVELS OF DIFFICULTY

The last chapter focused on the conclusion from research that goals that are more specific are more effective. This chapter stems from the research that indicates goals should be at the right level of difficulty – goals should challenge students but be perceived as attainable. How is it possible that a teacher with twenty-five students can write a goal that will be “challenging but attainable” for students who are on such different levels? The answer lies in differentiation, and differentiation begins with creating learning goals at different levels of difficulty. To do this, Marzano has created a new framework, or taxonomy, of learning goals. He has explained his ‘New Taxonomy’ in more depth in two other books, *The New Taxonomy of Educational Objectives* (Marzano and Kendall, 2007) and *Designing and Assessing Educational Objectives: Applying the New Taxonomy* (Marzano and Kendall, 2008).

Using the framework of the New Taxonomy, goals can be written at four levels of difficulty, each of which is described in more detail in the sections that follow:

- Level 4 – **Knowledge Utilization**: Using new knowledge to address real-world issues
- Level 3 – **Analysis**: Often called “higher-order” thinking because it involves extending one’s knowledge and making inferences
- Level 2 – **Comprehension**: Understanding the major ideas and important details of knowledge
- Level 1 – **Retrieval**: Recognizing and recalling basic information and executing procedures

Below is an example of taking a general topic, the solar system, and breaking it down into these four levels of difficulty.

LEVEL OF DIFFICULTY	LEARNING GOAL – The student will be able...	TASK
Level 4: Knowledge Utilization	... to investigate the gradual growth of knowledge about the solar system.	Select a current discovery about the solar system and investigate how it came about and how it changed our thinking.
Level 3: Analysis	... to identify similarities and differences between various planets in the solar system.	Identify two planets and compare two or more of their characteristics.
Level 2: Comprehension	... to explain the critical features of the Copernican model of the solar system.	Explain what you consider to be the most important features of the Copernican model.
Level 1: Retrieval	... to recognize or recall important details about the solar system.	Briefly explain these terms (list of solar system terms here). Determine which statements below are true (list of true and false statements below).

Each of the four levels of difficulty are made up of smaller mental processes in the following chart and described in more detail below.

OVERVIEW OF THE NEW TAXONOMY OF LEARNING GOALS	
LEVEL OF DIFFICULTY	MENTAL PROCESS
Level 4: Knowledge Utilization	Decision making, Problem solving, Experimenting, Investigating
Level 3: Analysis	Matching, Classifying, Analyzing Errors, Generating, Specifying
Level 2: Comprehension	Integrating, Symbolizing
Level 1: Retrieval	Recognizing, Recalling, Executing

Level 1: RETRIEVAL – Recognizing, Recalling, and Executing Goals

The first level of difficulty is comprised of three mental processes: *recognizing*, *recalling*, and *executing procedures*. *Recognizing* is at the lowest level and involves determining whether the information given is accurate, such as in a multiple choice or true-false question. *Recognizing* goals and tasks usually begin with verbs such as: recognize, select (from a list), and determine (if the following statements are true). *Recalling* involves producing information from memory. For example, if you asked students to choose a synonym for a word from a group, that would be *recognizing*, but if you asked students to produce a synonym for a word from memory, that is *recalling*. *Recalling* goals and tasks often use verbs such as name, list, label, state, identify (who, where, when) and describe. *Executing* means that a series of steps are performed, such as in multicolumn subtraction. Verbs used in *executing* goals and tasks include: use, demonstrate, show, make, complete, and draft. Below are some examples of these three types of retrieval goals.

TYPE OF GOAL	RECOGNIZING	RECALLING	EXECUTING GOAL
GENERAL STATEMENT OF KNOWLEDGE	Information about US presidents	Information about software programs	The skill of kicking a ball
TYPE OF KNOWLEDGE	Declarative knowledge	Declarative knowledge	Procedural knowledge
GOAL STATEMENT	Students will be able to recognize accurate statements about the first US president.	Students will be able to explain the purposes and advantages of Microsoft Word.	Students will be able to use their feet to stop and kick a ball.
SAMPLE TASK	Identify which statements about our first president are true: (list of true and false statements)	Explain why Microsoft Word was created and what it does that is unique.	When I kick the ball to you, using only your feet, stop it and kick it back to me.

Below is an excerpt of an exercise to practice understanding the difference between these three subsets of retrieval goals. If teachers need more examples of retrieval goals and tasks, see the numerous examples on pp. 29-43 before doing this exercise. Note that there are exercises like the one below for each of the four levels, however, only one sample from the book is presented below.

Exercise 3.1 IDENTIFYING DIFFERENT TYPES OF RETRIEVAL GOALS (see p.35 for the complete exercise)
For each goal statement at the retrieval level, identify why it would be considered a recognizing, recalling, or executing goal statement. 1. Students will be able to identify from a list the steps involved in photosynthesis. (Recognizing, Recalling, or Executing) 2. Students will be able to perform addition using two-digit numbers. (Recognizing, Recalling, or Executing) 3. Students will be able to name six prominent world political leaders. (Recognizing, Recalling, or Executing)

Level 2: COMPREHENSION – Integrating and Symbolizing Goals

The next level of difficulty is made up of only two mental processes – *integrating* and *symbolizing*. *Integrating* involves distilling knowledge down to its key characteristics and organizing it into a generalized form. Teachers use verbs such as describe (how, why, key parts of, the relationship between), explain ways in which, paraphrase, and summarize when using *integrating* goals and tasks. *Symbolizing* goals have students translate their understanding into some kind of graphic representation. *Symbolizing* goals and tasks are often introduced with verbs such as symbolize, depict, represent, illustrate, draw, use models, and diagram. Below are some examples of *integrating* and *symbolizing* goals and tasks.

TYPE OF GOAL	INTEGRATING	SYMBOLIZING
GENERAL STATEMENT OF KNOWLEDGE	The process of using the order of operations to solve algebra problems	Information about the solar system.
TYPE OF KNOWLEDGE	Procedural knowledge	Declarative knowledge
GOAL STATEMENT	Students will be able to summarize how to apply the order of operations to solve a problem.	Students will be able to create a model that shows the locations of the planets in our solar system.
SAMPLE TASK	We have used the order of operations to solve equations. Summarize the process, then solve an equation on your own using your summary as a guide.	Using the provided materials, create a model of the solar system. Use appropriately sized objects to represent the planets.

Level 3: ANALYSIS – Matching, Classifying, Analyzing Errors, Generalizing, and Specifying Goals

Analysis goals ask students to go beyond the material taught to make inferences and create new awarenesses. Analysis goals involve five different types of mental processes. *Matching* goals ask students to understand the relationship between different items by organizing them into groups or explaining the relationship between them. *Classifying* goes a step further by asking students to identify the subordinate category in which the knowledge belongs. For example, it is considered *matching* to have students organize states into any category of their choosing while it is *classifying* to have them organize the states into a subordinate category like Democratic, Republican, or Independent voting tendencies. *Analyzing errors* goals require students to identify errors in knowledge or procedures. For example, a student might be presented with three processes for finding the mean and asked to explain why several of them are wrong. *Generalizing* goals ask students to use inductive thinking to infer new generalizations from known information, while *specifying* goals are the opposite – they are *deductive*. Students must take a general rule or principle and make a prediction based on it. Below are some examples of these five types of analysis goals and tasks.

TYPE OF GOAL	MATCHING	CLASSIFYING	ANALYZING ERRORS	GENERALIZING	SPECIFYING
GENERAL STATEMENT OF KNOWLEDGE	Information about literary genres	Information about geometric shapes	Information about the use of nuclear energy	Information about the results of a basic experiment	Information about the environment
TYPE OF KNOWLEDGE	Declarative knowledge	Declarative knowledge	Declarative knowledge	Declarative knowledge	Declarative knowledge
GOAL STATEMENT	Students will be able to distinguish between fiction and nonfiction texts.	Students will be able to organize a set of shapes according to their properties.	Students will identify common misconceptions about nuclear waste.	Students will make conclusions drawn from a set of results.	Students will be able to specify the environmental conditions for human survival.
SAMPLE TASK	Explain the differences between fiction and nonfiction books.	From the objects in front of you, pick out the triangles and explain what makes a triangle unique.	Read the passage below. What are some errors in the author's understanding of nuclear waste?	Based on our static electricity experiment, what would you say causes it?	Create an ideal climate for people to live in and explain the principles used.

Level 4: KNOWLEDGE UTILIZATION – Decision-making, Problem-solving, Experimenting, and Investigating Goals

Knowledge utilization requires students to use their knowledge in new ways. In *decision-making*, students need to select among alternative solutions. *Problem-solving* goals involve some type of obstacles or limiting conditions. Students generate and test hypotheses using data the student has collected in *experimenting* goals. Finally, *investigating* goals have students examine a past, present, or future situation but the data is not gathered by the student, rather the data consists of existing assertions and opinions.

TYPE OF GOAL	DECISION-MAKING	PROBLEM-SOLVING	EXPERIMENTING	INVESTIGATING
GENERAL STATEMENT OF KNOWLEDGE	Information about research methods	The process of writing a story	Details about a specific technological innovation	Information about nutrition
TYPE OF KNOWLEDGE	Declarative knowledge	Procedural knowledge	Declarative knowledge	Declarative knowledge
GOAL STATEMENT	When presented with data collection techniques, students will be able to select the best one to answer a specific research question.	Students will be able to create and resolve a conflict in an original story in a novel way.	Students will be able to generate and test a hypothesis that demonstrates an understanding of the possible impact of recent technology.	Students will be able to investigate the relationship between diet and health.
SAMPLE TASK	If you want to know the standings of the presidential candidates among your peers, which data collection techniques would you use and why?	Write a story that involves a conflict between good and evil. Resolve it in a way that neither side has a decided victory.	Select a recent technological advance (e.g., the iPod). Develop a hypothesis about the impact it has had. Gather information to test your hypothesis.	Research two popular diets (Atkins and Zone) and their effects on overall health.

Chapter 4: ORGANIZING LEARNING GOALS INTO A SCALE/RUBRIC

The last chapter showed teachers how to design goals at four levels of difficulty while this one describes how to organize those goals into a scale or rubric. Research shows that giving appropriate feedback improves student achievement. For any given instructional unit, a teacher should begin by creating a *target goal* for *all* students in the class. This is the standard of success. For example:

Students will be able to create a flowchart depicting the rise and fall of Napoleon.

Then the teacher determines the level of complexity of this goal, or where it fits in the New Taxonomy summarized again here:

LEVEL OF DIFFICULTY	MENTAL PROCESS
Level 4: Knowledge Utilization	Decision making, Problem solving, Experimenting, Investigating
Level 3: Analysis	Matching, Classifying, Analyzing Errors, Generating, Specifying
Level 2: Comprehension	Integrating, Symbolizing
Level 1: Retrieval	Recognizing, Recalling, Executing

The Napoleon goal is an example of symbolizing, so it is a Level 2 Comprehension goal. This target goal can then be entered in the rubric below as a score of 3.0. Now that the teacher knows the level of the target goal, he or she can design a goal at a lower level, and place it in the 2.0 position. Here are two possible examples:

Students will be able to identify accurate statements about the rise and fall of Napoleon. (Level 1 Retrieval: Recognizing)

Students will be able to describe some important events in Napoleon's life. (Level 1 Retrieval: Recalling)

Finally the teacher would design a goal at a higher level for the 4.0 position, such as:

Students will be able to compare and contrast Napoleon and other military and political leaders. (Level 3 Analysis: Matching)

Note that the three goals do not involve different content; they just require different levels of complexity. Also, these are the only three goals the teacher needs to create because scores of 1.0 and 0.0 involve students achieving the same goals, but *with help* because they do not demonstrate competence working independently toward the other goals.

ABBREVIATED RUBRIC OF LEARNING GOALS	
Score 4.0	More complex learning goal
Score 3.0	Target learning goal
Score 2.0	Simpler learning goal
Score 1.0	<i>With help</i> , partial success at score 2.0 and 3.0 goals
Score 0.0	Even <i>with help</i> , no success at goals

To practice ordering goals by difficulty, below is an excerpt of an exercise. Again, the complete exercise and answers are in the book.

Exercise 4.1 ORDERING GOALS BY LEVEL OF DIFFICULTY (see p.66 for the complete exercise)

Each set of goals contains a target goal, plus a simpler and more complex goal. Label each set with a 1 (simplest), 2, and 3 (most complex).

- A. Students will be able to discuss the body's most important dietary needs.
 Students will be able to recognize healthy versus unhealthy foods given a list.
 Students will be able to discuss what would happen to the body if one of its needs was not met.
- B. Students will be able to design complex word problems based on given mathematical equations.
 Students will be able to translate between simple word problems and mathematical equations.
 Students will be able to recognize accurate statements about the mathematical processes embedded in word problems.

In addition to the whole number scores in the rubric above, teachers can add half points for partial mastery of a goal. For example, a score of 2.5 would mean the student has been successful at the 2.0 goal (the simpler goal) and has had partial success with the 3.0 goal (the target goal). Below is an example of a full rubric/scale for second grade science.

SCALE FOR SECOND GRADE SCIENCE	
Score 4.0	The student compares the different ways in which plants and animals breathe and find nourishment. <i>No major errors or omissions regarding the score 4.0 content</i>
Score 3.5	In addition to score 3.0 performance, partial success at score 4.0 content
Score 3.0	The student discusses what plants and animals need to survive (for example, air, food, water). <i>No major errors or omissions regarding the score 3.0 content</i>
Score 2.5	In addition to score 2.0 performance, partial success at score 3.0 content
Score 2.0	The student recognizes and recalls specific terminology such as plant, animal, and survival. The student recalls accurate information about the survival needs of animals and plants such as: both need food, water, and air to survive, plants absorb nutrients and air through roots and leaves, and animals use respiration to breathe and digestion to process nutrients. <i>No major errors or omissions regarding the score 2.0 content</i>
Score 1.5	Partial success with 2.0 goal and major errors with 3.0 goal
Score 1.0	<i>With help</i> , partial success at 2.0 and 3.0 goals
Score 0.5	<i>With help</i> , partial success at 2.0 goal but <i>not</i> at 3.0 goal
Score 0.0	Even with help, no success

To practice designing your own scale/rubric around learning goals, create a blank version of the scale above, then create a target goal (3.0), an accompanying simpler goal (2.0), and a more complex (4.0) goal to go with it. There is a blank reproducible in the book. Note that while most school goals are cognitive (focus on academic content), the research that was introduced in the beginning of the book suggests the benefits of supplementing these goals with noncognitive goals as well. The book contains examples of scales for noncognitive goals on pp.71-74. These goals include the following areas:

- Self-awareness/self-control
- Academic self-concept
- Empathy/respect
- Social awareness and response
- Goal setting
- Emotional awareness
- Study skills
- Team building
- Problem solving

Chapter 5: ORGANIZE LEARNING GOALS INTO YEAR-LONG AND UNIT PLANS

Following the approaches outlined in the previous chapters to design learning goals and accompanying assessment tasks will lead to a powerful system of instruction and assessment. This chapter provides guidance for organizing those goals into year-long and unit plans.

Organizing Learning Goals into a Year-Long Plan

Typically, the curriculum for a year is divided into two-week units that have approximately two to three learning goals each. This means that a teacher can address about 45 learning goals over the course of an entire year. Note that some goals may be repeated in multiple units because of their importance. For example, in a science curriculum for a year, presumably a goal involving understanding the scientific process would occur in a number of different units. Below is an excerpt of the first four units in a middle school science curriculum for the year. See pp.80-82 for the full chart. Note that the goal of conducting multiple experiments exists in both the second and fourth unit in the excerpt below. Also, the units are grouped together into larger “strands” or topics.

Excerpt of MIDDLE SCHOOL SCIENCE GOALS ADDRESSED IN A SINGLE YEAR	
Strand #1: Earth and Space Sciences	
Unit #1: Atmospheric Processes and the Water Cycle Goal 1: Students will illustrate how climate patterns are affected by the water cycle and its processes. Goal 2: Students will model how all levels of the earth’s atmosphere (troposphere, etc.) are affected by temperature and pressure.	2 weeks
Unit #2: Composition and Structure of the Earth Goal 3: Students will describe the unique composition of each of the earth’s layers and how the earth is affected by the interaction of those layers. Goal 4: Students will describe the constructive and destructive forces that create and shape landforms. Goal 5: Students will illustrate each stage of the rock cycle. Goal 6: Students will design and conduct multiple experiments that focus on...	3 weeks
Unit #3: Etc.	
Strand #2: Life Sciences	
Unit #4: Principles of Heredity and Related Concepts Goal 11: Students will classify specific reproductive characteristics (physical processes, etc.) as either sexual or asexual. Goal 12: Students will illustrate different ways organisms can be affected by heritable traits (diseases, abilities, etc.). Goal 6: Students will design and conduct multiple experiments that focus on...	3 weeks

Each of the goals in this chart is the “target goal” for the unit. The teacher would also create a scale of simpler and more complex goals and accompanying assessment tasks for each of these goals. Because the research shows the importance of noncognitive goals, the teacher might also integrate these goals into the year plan above. For example, the first unit might also include the noncognitive goal of working as a team and then the second unit might address the noncognitive goal regarding goal setting.

Learning Goals Within a Unit of Instruction

While a classroom that organizes units around learning goals might look quite traditional at first glance, in actuality, implementing this new type of unit involves a number of important different elements that improve student learning.

Students Gain Knowledge Throughout a Unit

In a traditional classroom, when students receive low scores on assessments, these low scores penalize them throughout the year because these low scores are averaged into their final grade. In contrast, in a unit organized around learning goals, students may begin the unit with a score of 2.0 on the scale/rubric, but if the student demonstrates improved competence by scoring 3.0 later in the unit, his score changes to represent his new status. Furthermore, students can keep track of their own progress with a chart like the one below (some people prefer to use a bar graph, others use a line graph such as the ones on pp.85-86):

STUDENT PROGRESS CHART – Keeping Track of My Learning

Name: _____

Learning Goal I: Students will illustrate how climate patterns are affected by the water cycle and its processes.

My score at the beginning (based on a preassessment): 2.0 My goal is to be at score 3.0 by Feb. 7

Specific things I am going to do to improve my score: _____

4.0					
3.5					
3.0					
2.5					
2.0					
1.5					
1.0					
0.5					
0	Jan. 10 – Preassessment	Jan. 14	Jan. 18	Jan. 24	Jan. 31

Students Take Responsibility for Gaining Competence

In a class organized around learning goals the teachers are the ones to design the assessment tasks that represent competence at the beginning of the year. However, as students become familiar with the types of tasks that demonstrate competence, they can begin to suggest their own tasks.

Cooperative Structures Aid in Student Learning

According to the research introduced in Chapter 1, cooperative learning structures have the potential to advance student learning. Cooperative learning is encouraged in classrooms organized around learning goals because cooperative structures enhance student progression through the levels on a particular scale. One example of a cooperative group structure that enhances learning through learning goals is *group investigation*. In this structure students are organized into groups to investigate a specific learning goal. Team members would gather information for various levels of the scale – 2.0, 3.0, and 4.0 – such that all levels of competence are covered within the group. Other group structures are described on pp.86-88.

Learning is Continuous

A classroom organized around learning goals is beneficial for students who do not initially demonstrate 3.0 or 4.0 competence. This is one of the most powerful effects of using learning goals – students can progress at their own pace. Once some students have achieved scores of 3.0 or 4.0 they can volunteer to help other students who have not. Or, they can begin working on other goals that will be addressed in future units. Those students who are still struggling can continue to work on the goals of one unit (with tutorial help) while still participating in the new goals of the next unit.

Grading More Accurately Measures Student Achievement

In a classroom with learning goals, students are *not* penalized for having low initial grades which are averaged into the overall final grade as they would be in a traditional classroom. Instead, a student can go back at any point during the year and raise those scores. This fits better with the spirit of most state standards and, more importantly, this encourages students to continue trying to increase their knowledge throughout the year. Keep in mind that if teachers *do* need an overall grade, they can average the scores from each goal (e.g., Goal 1: 2.0, Goal 2: 2.5, etc.) and come up with a final average using the scale below:

Average scale score	3.51-4.00	3.00-3.50	2.84-2.99	2.67-2.83	2.5-2.66	2.34-2.49	2.17-2.33	2.00-2.16	1.84-1.99	1.67-1.83	1.50-1.66	.00-1.49
Traditional grade	A	A-	B+	B	B-	C+	C	C-	D+	D	D-	F

Overall, implementing the complete system described in this book has the power to impact teaching and learning in a profound way. A classroom organized around learning goals provides students with a clear learning objective, an appropriate learning task, a scale which gives the student feedback, and an opportunity to improve learning – all which add up to improved student achievement.

The Main Idea's Professional Development Suggestions: INTRODUCE TEACHERS TO MARZANO'S LEARNING GOALS

I. Introduce Marzano's Learning Goals

Many teachers will feel they already know how to write objectives for their classes, so it is important to give teachers a fresh look at this issue by introducing a few aspects of goal setting that might be new to them.

The Research – To provide the rationale for thoughtful goal setting, either provide the teachers with the research on goal setting in my summary (pp.1-2), have them read the first chapter of the book, or look at the summary of the research in the tables on pp. 5, 10, and 11.

Important Aspects of Goals – Based on the research, teachers should understand the importance of creating specific goals, at the right level of difficulty, and which provide appropriate feedback to students. Introduce the concepts below, and depending on the experience your teachers have had writing goals, choose the appropriate exercises for them to do from that list (there are exercises in the book or use your own based on the excerpts in the summary). Note that by letting teachers choose the areas they need work on, this allows for ownership of the activities and differentiation based on teacher experience level:

Goals vs. Activities (chart on p.2 of the summary or Exercise 2.1 and p.21 of the book)

Declarative vs. Procedural Goals (excerpt on p.2 of the summary and Exercise 2.2 on p.22 of the book)

Translating Larger Knowledge Statements into Goals (chart on p.3 of the summary and Exercise 2.3 on p.23 of the book)

Designing Appropriate Assessment Tasks (excerpt on p.3 of the summary and Exercise 2.4 on p.24 of the book)

Designing Goals at Different Levels of Difficulty (Overview of the New Taxonomy on p.4 of the summary and Exercises 3.1 – 3.4 on pp.58-61 of the book)

Organizing Goals into a Rubric (see the Abbreviated Rubric and Sample Science Scale on p.6 in the summary and Exercises 4.1 – 4.3 on pp.75-78 of the book)

II. Diversifying the Types of Goals Teachers Use

While teachers may successfully complete the exercises above in a workshop, in their actual classrooms, they often rely on the same types of goals over and over. Individually, or in small groups of teachers who teach the same subject or grade, have teachers:

1. Self-Assess to Determine Which Types of Goals Teachers Use Most Often

Before this activity, make sure teachers understand the four levels of difficulty of goals as well as the 14 mental processes that make up these four levels. Show them the chart below, have them read Chapter 4, or have them read the summary of it.

LEVEL OF DIFFICULTY	MENTAL PROCESS
Level 4: Knowledge Utilization	Decision making, Problem solving, Experimenting, Investigating
Level 3: Analysis	Matching, Classifying, Analyzing Errors, Generating, Specifying
Level 2: Comprehension	Integrating, Symbolizing
Level 1: Retrieval	Recognizing, Recalling, Executing

Ask teachers to bring two weeks of lesson plans to this workshop. First, they should identify the goal or goals they taught each day (they may not have explicitly written these down previously). Then, have them use tally marks to indicate when they use a Recognizing goal, a Recalling goal, an Executing goal, etc. In small groups have them speak about what trends they notice in the goals they usually employ.

2. Diversify Learning Goals Using the 14 Different Mental Processes

Now, to help teachers diversify the types of goals they use in their classrooms, alone or in groups, have them take a general knowledge statement or standard, and write 14 more specific goals – one for each of the mental processes above. You can provide sample general statements such as:

Science: Understanding gravity

English: Writing effectively

Math: Rounding numbers

Social Studies: Knowing important leaders in history

For each of these statements, groups of teachers would write 14 goals:

Recognizing goal:

Executing goal:

Symbolizing goal:

Recalling goal:

Integrating goal:

Etc.:

To help with this, see the types of verbs used with each kind of goal on pp.124–126. Then, encourage teachers to use a wider range of goals, and in a future workshop ask them to bring in two weeks of lesson plans and again tally the types of goals they use to see the variety.

III. Planning Backwards from the Year's Goals to the First Unit's Goals

The goal here is for teachers to end with a year-long curriculum plan, an outline of the first group of units, and specifics about the first unit.

The Year-Long Plan

1. Once teachers know how to create effective learning goals, they can create a year-long plan which includes the goals for each unit. To start, show them a sample year's worth of goals organized into units (copy Table 5.1 on pp.80-81 or share the excerpt of a year plan on p.7 of the summary). Clarify that these are *target* goals for each unit, not a whole set of differentiated goals.

2. Then, to create their own year plans, it would be ideal to group teachers with others who teach the same grade and topic (i.e., all 8th grade math or all 4th grade teachers). If they create a *common* year plan, then they can plan together throughout the year, create common assessments, share student results, etc. If this does not work at your school, just pair up teachers to give each other feedback.

3. Start by having teachers map out about 4-5 larger topics (strands) and about 12 units that fit into those strands.

4. Then they can work together to come up with the target learning goals for just the first and second unit.

5. Finally, they should plan out unit 1 in more detail – a) create a diagnostic to preassess student knowledge in this area, b) create a rubric/scale for each goal (this means create simpler and more complex goals to differentiate), c) design the accompanying assessment tasks.

6. Teachers or groups can share these documents for feedback and revise if necessary.