



Introduction

Differentiating With Data for Student Growth and Achievement

WHAT IS OUR TARGET?

Today, the reality for teachers has shifted dramatically from a decade ago. No longer can we go into classrooms and “spray and pray,” hoping students will succeed. We are being held accountable for all learners, not only those who learn in spite of us but also those who learn because of us.

The 21st century learner differs immensely from learners even a generation ago. Today’s students look at typewriters, audiotapes, and rotary dial telephones as antiques that belong in a museum. They can’t imagine a world where communication and access to information isn’t achieved in a nanosecond with technology that should be commonplace to them. Thus, to use methods and techniques from the last century doesn’t connect to the reality of the learners’ world today. These students live in a cyber-tech environment, where pencil and paper often have little appeal and where novelty or relevance and meaning are a great need when it comes to ideas and information.

The world of learners demands new and different competencies if they are to succeed in the future. Thornburg (2002) reminds us that the world is in a constant state of flux. We continue to administer standardized tests with content that may be irrelevant in the world where students live. Beyond the test is the reality of the workplace and living a full and successful life in an ever-changing environment. Without a crystal ball, teachers go forth courageously, trying to prepare learners for a world whose shape is uncertain, a world that we may never see ourselves.

Partnership for 21st Century Skills (2008) has clearly defined the skills that are necessary for our students to develop in order to be successful in an unknown future society.

Three areas are outlined:

1. Life and career skills:
 - Flexibility and adaptability
 - Initiative and self-direction
 - Social and cross-cultural skills
 - Productivity and accountability
 - Leadership and responsibility
2. Learning and innovation skills:
 - Creativity and innovation
 - Critical thinking and problem solving
 - Communication and collaboration
3. Information, media, and technology skills:
 - Information literacy
 - Media literacy
 - Information and communications technology (ICT) literacy

Developing these skills should not be left to happenstance but crafted into the curriculum based on the Common Core State Standards with intention.

“According to Robert Reich (1992), the quality jobs of the future will belong to ‘symbolic analysts’—people who solve, identify, and broker problems by manipulating images” (Thornburg, 2002, p. 32). Reich’s basic skills include abstraction, system thinking, experimentation, and collaboration.

● CHALLENGES AND SHIFTS PRESENTED BY THE COMMON CORE STATE STANDARDS

Global competencies as well as the skills needed for 21st century learning have changed. To address this challenge, every state has a new set of standards for student demonstration of proficient learning and updated, high-stakes state assessments. All but a few states adopted the Common Core State Standards, including our territories. The other states, such as Texas, also adopted new more rigorous standards and assessments such as STAAR. This book is designed to help all districts and schools with these new challenges. While we highlight the Common Core State Standards, this book is designed to help all teachers use the data from their standards and standards-based assessments to differentiate for the wide variety of learners in our schools. Each district faces the challenge of

- more rigorous standards,
- use of complex text and digital resources,
- a strong focus on cross-content literacy,
- mathematics based on research practices and conceptual understanding as well as procedural fluency in real-world applications of complex mathematical ideas,

- a strong emphasis on citing evidence and source authenticity,
- the ability to communicate in-depth thinking in writing and other forms,
- the use of precise academic vocabulary in that communication, and
- deep analytic thinking skills in collaborative ways.

These shifts are used to create state assessments that require complex skill demonstration such as writing and researching digitally, constructing meaning mathematically, reading and interpreting online material from multiple sources, and using these skills to demonstrate student academic growth over time. Most students will need frequent rehearsal to not only demonstrate the standards but to demonstrate them online within the time parameters given. Not all students perform equally, so teachers will need to use these practice data to create opportunities for students to have the best possible success on a new generation of assessments.

WHY DIFFERENTIATE? ●

No longer is it an option to let students fall through the cracks. We recognize that they learn because of us and through the learning opportunities that we provide for the diverse learners that we have in classrooms today. As educators (and parents), we know that learners differ in many ways. Whether it is in appearance, learning style, multiple intelligence, prior experience, personal preference, or social/emotional development, students differ. Around the world, teachers are rising to the challenge of meeting the needs of those diverse learners while keeping the integrity of Common Core State Standards. We want not to lower the bar but, indeed, to raise the level of success and to increase growth for all students. Once the standards have been identified, we know that students like to receive and process new knowledge and skills in a variety of ways and will need many rehearsals to achieve mastery.

Thus, differentiating instruction to meet those diverse learners is a philosophy or mindset that teachers embrace, and there are ways to differentiate learning processes that are appropriate at different times in different situations with different learners. Students don't all learn the same thing on the same day in the same way. The dilemma for us as educators is to know the students well and to have a repertoire that can be used selectively and strategically based on the standards, the content, and the learners' needs. Knowing when, why, and how is the science of teaching. The art of teaching is the creativity that teachers use to include learners in the learning process based on their needs. The key to reaching targeted standards is planning for growth so that each learner may succeed to the best of his or her ability.

In this book, we explore ways of planning that consider

- Common Core State Standards;
- data about students and their knowledge, skills (pre-assessment, formative or ongoing, and summative), and ability to think diagnostically;

- information about students as individuals (learning styles, multiple intelligences, interests, preferences, and developmental [social, emotional, and physical] needs);
- unit planning (backward design); and
- lesson planning (chunking the learning to facilitate daily student engagement and rehearsal).

● THEATERS OF THE MIND: LEARNING SYSTEMS AND THE BRAIN

What do we know about learning and student growth? In recent years, we have learned a lot about how the brain is organized and how it functions, and what we have learned raises questions for us as teachers.

According to Ornstein (1986), the brain is a complex biological organ with several systems embedded in its structures:

Stuck side by side, inside the skin, inside the skull, are several special purpose, separate, and specific small minds. . . . The particular collection of talents, abilities, and capacities that each person possesses depends partly on birth and partly on experience. Our illusion is that each of us is somehow unified, with a single coherent purpose and action. . . . We are not a single person. We are many. . . . All of these general components of the mind can act independently of each other, [and] they may well have different priorities. (pp. 8–9)

These functions are not processed consciously but occur automatically.

Restak (1994) identifies five systems that interact constantly as we receive, process, and interpret information. It is like a multiplex theater that never closes, according to Given (2002), where several movies are playing at the same time. The five systems are as follows:

1. Emotional learning system
2. Social learning system
3. Physical learning system
4. Cognitive learning system
5. Reflective learning system (see Figure I.1)

The emotional, social, and physical systems are greedy for attention and will not allow the cognitive and reflective systems to function at optimal efficiency if their needs are not met.

Emotional Learning System

It has long been known that negative emotions and social interactions can inhibit academic progress (Rozman, 1998). Students will spend an

Figure I.1 Five Theaters of the Mind

Emotional	Social	Physical	Cognitive	Reflective
<ul style="list-style-type: none"> • Climate • Emotional safety • Relevancy • Meaning 	<ul style="list-style-type: none"> • Inclusion • Respect • Enjoys others • Interaction • Interpersonal • Sharing • Authentic situations • Tolerance 	<ul style="list-style-type: none"> • Requires active involvement • Enjoys challenging tasks that encourage practice • Skills are a major part of this system 	<ul style="list-style-type: none"> • Academic skill development • Prior and new learning connected • Seeks patterns, concepts, themes • Likes to see wholes and parts 	<ul style="list-style-type: none"> • Personal reflection on one's own learning styles • Reflects on successes, failures, and changes needed • Metacognition of one's own strengths and preferences

Source: Adapted from *Teaching to the Brain's Natural Learning Systems*, by B. Given, 2002, Alexandria, VA: ASCD.

inordinate amount of attention and energy protecting themselves from ridicule and rejection rather than learning new knowledge and skills.

Researchers tell us that we need emotional nourishment from birth (Kessler, 2000; Palmer, 1993). Lack of it affects us profoundly. Endorphins and norepinephrine (the feel-good neurotransmitters released in the brain during positive experiences) influence positive emotions and support learning along with good health and success in life (Pert, 1993). Emotions are both innate and acquired. Surprisingly, peers and siblings have much more impact on learned emotions (45 percent) than do parents (5 percent), according to Harris (1998).

When emotional needs such as love and acceptance are met, the brain produces serotonin (a feel-good neurotransmitter). When emotional needs are not met, young people often turn to drugs to obliterate the negative feelings of hunger, fatigue, and depression. A natural high can result through connectedness and meaningful interactions, interesting learning materials, and attention to students' personal needs and goals. Csikszentmihalyi (1990) refers to the "state of flow" where all systems are focused and challenge is matched to skill level. In this state, all systems are go and work together toward optimal learning.

The emotional system flourishes in classrooms and schools

- where educators and students believe students can learn and be successful,
- where students' hopes and dreams are recognized,
- where teachers make learning relevant to students' lives,
- where teachers provide multiple ways for students to express themselves,
- where teachers continue to challenge students, and
- where the climate nurtures rather than represses.

Social Learning System

From birth, we begin to form relationships with others and our environment to better understand ourselves. There are two social subsystems. One system in place at birth relates to dyadic relationships. The other evolves and deals with group relationships (Harris, 1998). The extent to which we feel part of a group influences our behavior in and out of school. All of us prefer to interact with those whose presence increases the brain's feel-good neurotransmitter brain levels, resulting from feelings of comfort, trust, respect, and affection (Panksepp, 1998). Yet, often in classrooms, there is no opportunity to develop social interactions that promote trust and connections. We naturally tend to participate in groups so that we feel a kinship that is fostered by group norms and values (Wright, 1994).

A skillful, insightful teacher can capitalize on this knowledge by creating a classroom climate that

- includes all learners,
- honors their hopes and aspirations, and
- provides an enriched environment for authentic learning (Given, 2002).

Physical Learning System

The physical learning system involves active problem-solving challenges. It is often the system that is not used enough in classrooms, even though we know that gifted students (Milgram, Dunn, & Price, 1993) and underachievers (Dunn, 1990) have a preference for active, tactile, and kinesthetic involvement when learning new material.

Those of us who have found learners in our classrooms who need to have the physical learning system in the forefront have realized that if we ignore this system, the learners will find a way to move to satisfy their needs regardless of our plans. Their movement might have nothing to do with the knowledge or skills that have been targeted for learning. So it begs the question: Do we build in opportunities for hands-on, active learning or do we let students find a way of their own to use physical systems, a way that may be counterproductive to the learning?

Cognitive Learning System

This is the system that we focus on most often in the classroom and rightly so as we want students to succeed in learning new knowledge and skills. The cognitive system deals with consciousness, language development, focused attention, and memory. This system also relies on the senses for processing information. Thus, good teachers facilitate learning by providing information in a novel way, stimulating the visual, auditory, and tactile senses as well as taste and smell, if appropriate. However, as previously noted, the emotional, social, and physical systems seem more greedy for attention, and if their needs are not attended to, students will not be comfortable enough to learn. If all systems are go, students tend to learn with more ease and with greater retention.

Reflective Learning System

Dr. Art Costa has been known to say that intelligent people “know what to do when they don’t know what to do.” People learn from experience only if they reflect on the experience.

This intelligence includes “thinking strategies, positive attitudes toward investing oneself in good thinking, and metacognition—awareness and management of one’s own mind” (Perkins, 1995, p. 234). Damasio (1999) notes that the reflective system involves the interdependence of memory systems, communication systems, reason, attention, emotion, social awareness, physical experiences, and sensory modalities.

The reflective system allows us to

- analyze situations,
- examine and react,
- make plans, and
- guide behaviors toward goals.

This is the system that, in the rush to cover the curriculum, is often left out of the learning process in the classroom. However, the skills of ongoing reflection and self-examination are key to evolving the self. These metacognitive skills enable students to form a clear image of self and to develop the reflective strategies that lead to self-directed learning and success in life.

LEARNING SYSTEMS AND STUDENT GROWTH ●

In each chapter of this book, we will look at the interaction of these learning systems and their impact on the learning process. We will acknowledge that every brain is unique and that how smart we are is not as important as how we are smart. Being cognizant of learning styles and preferences is another lens through which we know our learners and respond to their interests and needs. This knowledge is imperative for planning purposes and for identification of the hook each learner needs to become engaged with the learning.

We have also acquired research about instructional best practices that show great promise for student achievement. A decade ago, from research in the 1990’s *Classroom Instruction That Works*, Marzano, Pickering, and Pollack (2001) proposed nine essential strategies and provided a field book full of examples of these strategies in a variety of subject areas. These nine strategies have had a profound impact on student learning: as much as 22 to 45 percentile gains in student achievement. Figure I.2 shows the nine essential strategies and their percentile gains (Marzano et al., 2001).

In the previous edition, we suggested that if we were going to differentiate instruction for students, it probably would be best to include the best instructional strategies that we have available to us so that the chances of student learning and achievement are greater. In this book, we will endeavor to help teachers plan to use brain research as well as the pedagogical best practices to increase student engagement and learning with a diverse population.

Figure I.2 Nine Essential Teaching Strategies and Associated Percentile Gains in Student Achievement

Teaching Strategy	Percentile Gain
1. Recognizing similarities and differences using metaphors and analogies	45
2. Summarizing and note taking	37
3. Reinforcing effort and providing recognition	29
4. Homework and practice	28
5. Nonlinguistic representations	27
6. Cooperative learning	27
7. Setting objectives and providing feedback	23
8. Generating and testing hypotheses	23
9. Questions, cues, and advance organizers	22

Source: *Classroom Instruction That Works*, by R. Marzano, D. J. Pickering, and J. E. Pollack, 2001, Alexandria, VA: ASCD.

Over the past ten years, as teachers have experimented with these strategies and struggled through implementation, new research and insight into how the strategies should be grouped and integrated and what impact they have has emerged. More information on these strategies is available in Chapter 6.

● CONNECTING DATA TO LEARNING

Where is the connection between data and learning? Many teachers teach much the way they were taught. They ask the following questions:

- What is the next chapter in the book?
- How much content do I need to cover?
- How will I teach this skill or content?

We call this commonly used style “teach, test, and hope for the best.”

Standards-based education facilitated the beginning of a shift from these teacher-centered questions to a greater focus on student learning. The new questions are the following:

- What should my students know and be able to do?
- How will I know they “get it”?
- What activity might be motivating for students?
- What learning processes will I offer or facilitate?
- What will I do if that doesn’t work?

These questions are an excellent start. However, we may need to pose other questions, since the target for success is changing. It is not enough to demonstrate standards; now we must pose questions that help us focus on student growth.

Research-Based Instructional Strategies

Many fine educators respond to this louder call for student growth with an increased focus on strategies. Excellent research, the kind with large effect sizes and replication of results, is summarized in Marzano et al. (2001). Reeves (2000) also reminds us that it's unrealistic to think that teachers or any professional would come into the profession with all the knowledge and skills necessary to do the job. Learning is a continuous lifelong process as new information and strategies are identified that should be added to our repertoire.

As we retool for this next standards-based challenge, a focus only on varying the research-based strategies may not produce the results we want for our students. We must also retool our metacognition about teaching and learning to include the relationship of these strategies to what we know about the achievement levels of our students against the standards.

Sally L. has been teaching for twenty-two years in middle or junior high schools. She is frequently puzzled by phenomena she has noticed over the years. Even when she uses a variety of strategies and materials, not all of her students perform well on assessments, and some rarely demonstrate the ability to generalize that learning across curricula or time. Sally has learned about performance assessment design and standards over the last ten years. Before that, she carefully studied objectives and elements of instruction. Sally is the type of teacher whom principals value. She frequently mentors new teachers and considers herself a lifelong learner. Sally has been told that student growth is important, as if she didn't know that already. Current accountability practices in her district leave Sally frustrated rather than empowered. How can she get more students to perform and think at deeper levels about the standards she is teaching?

Sally is not alone. Then again, she may be asking the wrong questions. Schools often use high-stakes data these days to plan for school improvement and governmental accountability. Could we apply some of the best of these practices to the classroom? Could we begin to make decisions involving data about what and how we teach and how students learn? How will we use what we know about student standards-based learning to increase academic performance every day, not just on high-stakes state assessments?

Response to Intervention is an important consideration when increasing student performance. This legal responsibility now requires us to differentiate using the "science of learning" to help all students achieve the standard of learning we created. The good news is that today, the science of learning is more established than even ten years ago. We know what works well in teaching and learning practices not only in general but specifically related to the brain and remembering what we learn, the acquisition of literacy and the use of literacy to further new learning, practices

that promote a culture of learning, the mathematical practices that allow us the greatest access to more career choices, and methods of engagement that increase the probability of long-term learning. We will use this research to help each educator envision and practice differentiation in standards-driven classrooms.

Standards-Based and Data Driven Instructional Strategies

Standards-based and data driven decision making in the classroom is about connecting what we know about students and what we want them to learn in relation to the standards with the best possible strategy for success. We need to know where and how students are performing when they walk into our classrooms and as they progress in their learning throughout a lesson. Then, using the standards-based final assessment as our target, we will ask a different set of questions:

- What do we know about students' readiness, ability, and interests in relation to the standards and benchmarks?
- What thinking, skills, products, and processes will they need to demonstrate on the final assessment?
- What don't I know about their skills, thinking, strengths, and preferences?
- How will I know if students are making progress along the way, before they attempt the final assessment?
- What are the standards-based performances students must demonstrate proficiency on and what do I do if they don't reach that level of required proficiency?

Each district and school needs a regular cycle of curriculum scope and sequence updates, given the dynamic nature of a Common Core driven educational environment. While we focus on the classroom level for standards-based instruction in this new edition, we encourage each district to clearly articulate the curriculum. Remember that the standards alone are not sufficient in detail to help teachers plan successful daily learning for students. Curriculum cycles must include the creation of a clear scope and sequence that emphasize the spiraling nature of the Common Core standards. What does it mean to write an argument in kindergarten or in sixth grade versus eleventh grade, in career areas such as welding and automotive technology, in economics versus history, and in biology versus physics? These district considerations are critical to teacher success. In addition, districts need to look at common assessments that help all teachers of the same grade or content determine if students are making sufficient progress to do well on state-required, dual-credit, or industry-based assessments. Resources on outstanding district-level curriculum design abound. It is important to set up a regular cycle to address changing state requirements.

Districts must also prove the tiered support specified by a Response to Intervention (RtI) Plan. This is critical to standards-based success. Teachers cannot move every student forward without this type of assistance and plan. The reality of today's diverse classroom is that some students cannot

be served even by well-differentiated classroom instruction alone. However, with these and other supports for English language learners and special education students as well as others on legal plans, teachers should be able to move all students in their classrooms forward toward standard-based proficiency.

Sally may find that answering these questions will help more students achieve at proficient levels in a reasonable amount of time. If Sally can systematically plan student learning to close the gap between what students will need to do and know and what they can accomplish now, her instruction and therefore the learning will result in growth for more students.

USING CLASSROOM DATA TO PLAN DIFFERENTIATED INSTRUCTIONAL STRATEGIES

Beware of the learning gap—you may fall into it. High-stakes data give us only one piece of evidence about student learning. Well-designed standards-based data collection and analysis—the everyday information a teacher collects—forms the backbone of student growth. Collecting the right data and then understanding the data feels like a monumental task to most teachers. We hope to give you insights and practical strategies for designing pre-assessments, formative assessments, and final assessments that will give you useful data. We also want to help you craft the diagnostic thinking to tie what you know about students to how you choose to improve their skills.

Diagnostic Thinking

Effective use of classroom standards-based and learner-centered data increases the probability that more students will demonstrate proficient and higher levels of performance. When to collect that data and how to ensure quality assessment practices are essential components in reaching our desired target (Stiggins, 1997).

Diagnostic thinking involves the understanding of cause and effect on student learning.

- If I do this or if students do this, what effect can I reasonably expect?
- If I know this about my learners, what strategies, materials, grouping, and amount of time may result in the greatest learning?
- Are my expectations for students appropriate, given the standards I want them to demonstrate?
- What type of learners may be successful using this type of learning practice?

While this type of planning, instruction, and learning takes some time-consuming, up-front work, it has numerous long-term benefits. Data driven decision making helps teachers maximize the limited time they have with students. Given the improved accuracy of instruction from this type of planning, teachers can reduce the amount of repetition and review in the curriculum.

TARGETING GROWTH FOR ALL STUDENTS

Accurate instruction also increases the chances that more students will reach the target. That is, after all, the bottom line. If our target is the growth of all students, how do we get there? The gap between what feels good in teaching and what works (and for which students it works) is vast. We hope this book closes that decision-making gap for you. In Figure I.3, we offer you an outline of the elements in each chapter of this book that will help you use data to ensure student growth and achievement.

Figure I.3 Differentiating With Data for Student Growth and Achievement

Data to Create Climate	Data to Know the Learner	Assessment Data	Curriculum Design	Adjustable Assignments	Instructional Strategies
<p>Building connections</p> <ul style="list-style-type: none"> • Risk taking • Theaters of the mind • Resilience • Nurture <p>Foster and sustain growth</p> <ul style="list-style-type: none"> • Feedback • Reflective learning • Rituals • Respect • Cultural history • States of mind • Celebration • Higher-level thinking 	<p>Learning styles</p> <ul style="list-style-type: none"> • Strengths • Needs • Attitudes • Preferences <p>Eight multiple intelligences</p> <p>Intelligent behavior</p> <ul style="list-style-type: none"> • Persistence • Listening • Metacognition • Flexibility • Accuracy and precision • Posing questions and problems • Experience and new application • Sensory • Creativity • Efficacy 	<p>Diagnostic thinking</p> <ul style="list-style-type: none"> • Pre-assessment • Formative assessment • Formal versus informal data collection • Performance assessments <p>Analyze formative data</p> <ul style="list-style-type: none"> • Grouping • Selecting differentiation strategies • Critical thinking <p>The role of other forms of assessment</p> <ul style="list-style-type: none"> • Using summative data • Self-assessment 	<p>Curriculum mapping</p> <ul style="list-style-type: none"> • Standards-based • Focus and target • Expectations <p>Unit planning</p> <ul style="list-style-type: none"> • Standards • Benchmarks or objectives • Key concepts • Skills • Critical questions • The role of critical thinking • Relevance • Final assessment • Rubric • Pre-assessment • Chunking a unit • Transition points 	<p>TAPS</p> <ul style="list-style-type: none"> • Total group • Alone • Pairs • Small group • Adjustable grids • Compacting <p>Adjusting for competency</p> <ul style="list-style-type: none"> • Content and materials • Communication and technology • Multiple intelligences • Readiness • Interest and choice • Process and rehearsal 	<p>Best practices strategies for</p> <ul style="list-style-type: none"> • Sensory memory • Short-term memory • Long-term memory <p>Research-based strategies</p> <ul style="list-style-type: none"> • Inductive thinking • Note taking and summarizing • Homework • Nonlinguistic representations • Cooperative group learning <p>Unit lesson planning</p>