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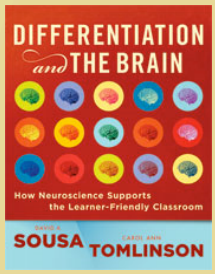

File: Differentiation & Brain-Based Learning

Differentiation and The Brain: How Neuroscience Supports the Learner-Friendly Classroom

By David A. Sousa & Carol Ann Tomlinson (Solution Tree Press, 2011)

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

The main ideas of the book are:

- Recent research about differentiation and how the brain learns can be used together to make classrooms truly effective for an increasingly diverse student population.
- Based on this research, the book shows teachers how to establish and manage differentiated classrooms.

Why I chose this book:
Teachers face an enormous challenge every day. How can they possibly address the great variety of learning needs in their classes? By combining the research in differentiation and neuroscience, the top thinkers on these two subjects, Carol Ann Tomlinson and David Sousa, provide a well-thought-out response.

Many books on differentiation simply list differentiation strategies teachers can use, but they don't provide the groundwork necessary for the differentiation to succeed. In contrast, Tomlinson and Sousa astutely take a step back and help teachers see the big picture. They show how the larger elements – curriculum, assessment, classroom environment – need to be shaped to truly support differentiation. Only then do they provide more concrete suggestions for differentiating in the classroom.

The Scoop (In this summary you will learn…)

√ *All of the components of a complete model of differentiation and how these are supported by brain research*

√ *Why teacher mindset and the classroom learning environment are so important to the success of differentiation*

√ *The components of a quality curriculum that are necessary to support differentiation*

√ *How assessment can undermine or support differentiation, depending on how it is used*

√ *A variety of ways to differentiate according to student readiness, interest, and learning profile*

A lot of research has emerged about how the brain learns. At the same time, our classrooms have become filled with an increasing mix of students with different abilities, cultures, and languages. Educators would be remiss to ignore the ways this research can help us make better decisions about curriculum, instruction, and assessment to meet all students' needs. This research comes from a new discipline called *educational neuroscience* that pulls together research from cognitive psychology, neuroscience, and pedagogy and has important implications for educational practice. This book looks at the basic principles of differentiation in conjunction with this current research about how the brain learns and provides suggestions to better meet the needs of an increasingly diverse student body.

Chapter 1: Overview of Differentiation

Overview of Differentiation

Differentiation is not new. Teachers attempted to meet the needs of diverse students back when one-room schoolhouses contained students of all ages in one class. Now, even when we have students of a similar age in one room, research shows that the pace of brain development varies among children. For example, in a class of third graders, some students read at a first grade level while others read at a sixth grade level. Furthermore, not only do students of a similar age not learn at the same rate, they also don't necessarily learn in the same way or with the same support systems. However, many teachers plan as if all students are alike and simply try to fill in the gaps when students are confused or bored.

Instead, the idea of differentiation is that teachers will plan with students' differences in mind. The goal is for the teacher to ensure that students are engaged and learning rather than simply covering the material. For example, if a student has gaps in knowledge from the past, it is the *teacher's* role to help that student learn effectively. Similarly, if a student already knows the material, it is also the *teacher's* role to make sure that the student continues to grow. Furthermore, if a student cannot learn effectively with one mode or with one type of content, the effective teacher looks for a different learning mode or a bridge to the content to help that student learn. Differentiation is *not* a set of strategies, rather it is a way of *thinking* about teaching and learning.

A Model for Effective Differentiation

Below is one particular model of effective differentiation that will be used throughout this book. The components of the model are described briefly below the chart and will be described in more detail in the rest of the book.

DIFFERENTIATION…
is a teacher's response to learner needs…
Shaped by mindset and guided by the following principles:
1. Respectful tasks 2. Quality curriculum 3. Flexible groupings 4. Continual assessment 5. Building community
Teachers can differentiate through…
1. Content 2. Process 3. Product 4. Affect/Environment
According to students'…
1. Readiness 2. Interest 3. Learning profile
Through a variety of instructional strategies such as…
Graphic organizers, scaffolding reading, small-group instruction, learning contracts, tiering, learning/interest centers, differentiated homework, etc.

Box 1: As described above, differentiation means a teacher responds to learner needs. Effective differentiation depends on teachers' belief that students can master content if they work hard. This model outlines five key principles that drive effective differentiation:

1. Students are respectful of each other. Even when their tasks differ they see these tasks as equally engaging.
2. The curriculum is designed for student understanding, not just recall. The goals are clear to both students and teachers.
3. Teachers plan flexible groups of students based on readiness, interest, and learning preferences.
4. Teachers use preassessments and ongoing assessments to match instruction to student needs.
5. Teachers intentionally create the type of positive learning environment necessary for successful differentiation.

Box 2: In this model of differentiation, teachers can modify four elements based on student readiness, interest, and learning profile.

1. Teachers can modify *content* (what students learn)
2. Teachers can modify *process* (how students will learn or the activities to help students make sense of the material)
3. Teachers can modify *product* (how students demonstrate what they have learned)
4. Teachers can modify *affect* (attention to students' feelings and emotional needs)

Box 3: There are a variety of strategies teachers can use to help them address differences in student need. Once teachers have a wide range of these strategies in their toolbox, they can more easily address students' varied readiness levels, interests, and learning preferences.

Differentiation is Supported by Brain Research

Recent discoveries in brain research support the basic principles of differentiation outlined above. All of these insights into how we learn reinforce the idea that it is important for teachers to recognize individual student needs. These principles are:

1. *Each brain is unique*. Even identical twins from the same household learn differently. We all have different preferences for how we learn (we prefer learning alone, or in a group, by observing, or participating). The idea of having *one* curricular, instructional and assessment approach is *not* brain-compatible.
2. *The brain looks for patterns*. The brain decides whether incoming information has meaning. The more information a learner acquires, the more likely the learner will develop patterns that the brain can recognize.
3. *The brain needs divergent thinking to expand cognitive networks.* Most tasks in school involve *convergent thinking* – solving a problem that has one correct answer. However, students use *divergent thinking* when they generate creative ideas or different ways of solving problems and this produces new brain patterns and expands cognitive networks.
4. *Emotions affect learning*. Chemicals are released in the brain to either keep us motivated to continue learning (when something is interesting) or to shut down the brain's processing (when anxiety takes over).
5. *Learning is also a social process.* Self-concept and social relations play a role in enhancing learning.
6. *There needs to be a meaningful reason for information to be stored in long-term memory.* Students often forget information after they have a taken a test on it. Differentiation can help students move information from working memory to long-term memory by making it more meaningful.

It is important to note that effective differentiation does *not* mean a teacher needs to modify everything for every student throughout the day. Rather, it means that in general, teachers should be aware of: (1) how their content is organized for meaning, (2) who their individual students are, and (3) which aspects of their classrooms they can modify to better connect content and learners.

Chapter 2: Mindset, Learning Environment, and Differentiation

Effective differentiation depends a great deal on teacher mindsets and the learning environment in the classroom. It is helpful to keep these two elements in mind when implementing differentiation.

Mindsets

What are mindsets? They are our attitudes, assumptions and beliefs that have developed, usually unconsciously, over time. How we react to students is shaped by these mindsets. For example, you might discuss a student with another teacher and feel like you are talking about two completely different students because of your different mindsets. One of you sees the student's constant raising of questions as a sign of confusion while the other one assumes it's the student's attempt to derail the lesson.

Research shows that even small gestures from a charismatic adult – like showing respect and appreciation for different learning needs in a differentiated classroom – can have a lifelong impact on students. For this reason, it is important that teachers have a mindset that guides their behavior productively in differentiated classrooms. Effective teachers have a mindset that includes the following:

A teacher with a positive mindset makes the classroom safe

The primary function of the brain is to help its owner survive. Any incoming data (such as a burning odor) that is interpreted as a threat is processed right away. Next in line to be processed are emotional data (anger, fear, joy). Only when threats and strong emotions are no longer present can students process factual information and concepts. This means that effective teachers ensure their students feel physically safe and emotionally secure so they can turn their attention to cognitive learning.

A teacher with a positive mindset creates a positive learning environment

In a differentiated classroom when a student is not learning, a teacher with a positive mindset believes it is important to change his or her learning style to meet the student's needs. In this type of positive learning climate, students' brains produce chemicals called *endorphins* that run through the bloodstream and cause the frontal lobe to better remember the learning objective.

However, if a teacher believes certain students are inherently lazy or unmotivated, this negative mindset causes the teacher to react to those students with annoyance. The resulting negative learning climate creates stress which causes the release of the hormone *cortisol* into students' bloodstream which then prompts the frontal lobe to stop processing the lesson objective in order to deal with the stress.

A teacher with a positive mindset addresses the social-emotional needs of students

In a successful differentiated environment, teachers realize that they must attend to students' social as well as cognitive needs. They understand that their job is more than simply delivering content, and that their students are also learning about themselves, their emotions, their reactions to failure, how to interact with peers, and how to choose friends. Recent brain research shows that in the frontal lobe there are separate neurons dedicated to processing social interactions. In children and adolescents the frontal lobe is not yet mature enough to have full control over social and emotional processing. Effective teachers recognize that students have these needs while also attending to the curricular objectives.

A teacher with a positive mindset reinforces students' areas of competence
Teachers often focus on students' problems. Instead, we can teach students to identify the ways they learn best and give them opportunities to use their areas of strength to help other students.

A teacher with a positive mindset has a 'growth' mindset
Through decades of research, Carol Dweck has found that at a young age we develop a 'fixed' or a 'growth' mindset about ability and success. Those with a fixed mindset believe we are either born smart or not. In contrast, those with a growth mindset believe that it is our own persistence that leads to our success. Teachers with this latter mindset believe that most of their students, if they just work hard enough, can learn most things. When teachers have this type of mindset the resulting learning environment is more conducive to differentiation. They create work that challenges students where they are, they don't accept excuses for why a student hasn't completed the work, and they don't label students and put them into a permanent "low" group. In fact, the model of differentiation introduced in this book is almost impossible to implement effectively with a fixed mindset.

Chapter 3: A Quality Curriculum and Differentiation

Although differentiation is an *instructional* approach, it is impossible to implement effectively without a *quality curriculum.* What we teach (curriculum) has a large impact on how we teach (differentiation). The model of differentiation in this book puts forth the idea that all students should have access to the highest quality curriculum possible and that effective differentiation is what will make that access possible. According to the model, a quality curriculum is one in which students make meaning of the content so they can retain, apply, transfer, and critique what they are learning. There are five key components to a quality curriculum, each of which is described below: (1) Organized around essential goals, (2) Aligned, (3) Focused on student learning, (4) Engaging, and (5) Authentic.

1st Component of a Quality Curriculum – Organized Around Essential Content Goals
A quality curriculum is centered around a set of objectives and goals that capture the heart of each discipline. It should specifically outline the knowledge, understanding, and skills that students must master to meet the learning goals. It is not a list of what students do in a classroom, nor is it a textbook. However, the reality is that teachers often must cover far more content than they are able to within a single school year. Teachers end up racing through the material, but students do not end up learning it. Why don't students learn all of this material? For two reasons, both backed by brain research:

(1) The working memory has a limited capacity – research shows that when working memory reaches its capacity, additional information will be rejected and therefore cannot be stored in long-term memory.
(2) To find meaning in new information, the brain's neural networks seek patterns. When new information is introduced, the brain analyzes it to see if there is a connection to information already stored. However, making new patterns and cerebral networks requires reflection and takes time. Racing through the curriculum does not provide this time.

When the brain is trying to connect new learning to past experiences in order to decide whether to store the information in long-term memory, the brain asks two questions: "Does this make *sense*?"(Does this fit into what the learner knows) and "Does this have *meaning*?" (Is this *relevant* to the learner). For the past decade, brain scans have shown that there is more cerebral activity when the answer to both questions is, 'yes.' However, teachers spend over 90 percent of their planning time to help students make *sense* of the material. To convince the brain to store new information in long-term memory, teachers should help students find *meaning* as well.

2nd Component of a Quality Curriculum – Aligned
For the first time, five students took an advanced level class. Despite having a tutor and feeling prepared, they all failed their exam. The cause was a common one: the teacher's lectures emphasized one area of the curriculum, the text focused on another, and the exam measured something all together different. This is classic example of a misaligned curriculum. To be effective, the essential elements of a curriculum must be aligned – the goals, assessments, and learning experiences. While this may sound obvious, it is one of the major reasons for poor results. Once learning goals are carefully chosen, every aspect of the curriculum must focus on those goals.

3rd Component of a Quality Curriculum – Focuses on Student Understanding
School is often about memorizing – memorizing countries, capitals, parts of the human body, parts of speech, etc. However, students often lose much of what they memorize after they take a test. These "successful" students leave school without understanding the larger lessons of history, understanding the systems in science, or seeing math as a tool for reasoning. A quality curriculum helps students develop a larger understanding of a discipline's concepts and principles, or what some call "big ideas." This helps students retain and apply what they've learned more easily. A student who understands history as a cycle no longer sees disconnected chapters in a history text. This does not mean that students don't learn knowledge and facts, but they learn these in the *service* of making meaning. When students understand in a deeper way, their brain has more of a chance to make connections between the new material and the student's experiences and build on existing neural networks as discussed above. Building students' understanding is not only brain-friendly, it supports differentiation as well. When the goal is to understand, *not* to learn specific knowledge and skills, teachers in a differentiated classroom can help students focus on the specific knowledge and skills they need to reach the understanding.

4th Component of a Quality Curriculum – Engaging

Children have an innate desire for discovery. They want to get new information for the sheer pleasure of it. Neuroscientists believe that the young brain has specific circuits for intrinsic motivation. If a curriculum motivates students, they will better engage with the knowledge, skills, and understanding. One way to do this is to provide learning experiences that are relevant to them. One teacher got discouraged students to see themselves as readers and writers by using the type of technology they found relevant (blogs, vlogs, and digital portfolios). Another teacher helped his fourth graders relate to the Pilgrims by having them make bread and spin yarn the way the Pilgrims did. Relevance increases student motivation and therefore student achievement.

5th Component of a Quality Curriculum – Authentic

Students rarely approach a discipline the way an expert would. In fact, students probably think historians go to work, read a chapter in a textbook, and answer questions at the end. An authentic curriculum engages students to propose answers to environmental or economic problems rather than just studying them in a text. An authentic curriculum that holds the brain's interest would have the following characteristics: students use the skills and knowledge an expert would, they work on complex and ambiguous problems like an expert, and they develop the habits of mind that experts in the field use.

The key to differentiating a quality curriculum is not to create the curriculum and *then* differentiate. It should be planned with student differences in mind, that is, different reading and writing abilities, different levels of readiness, different interests, and different preferences for learning.

Chapter 4: Classroom Assessment and Differentiation

This chapter focuses on how assessment can be used to more effectively meet the needs of diverse learners.

The Current State of Assessment is Not Brain-Friendly

Traditionally teachers have used assessments to determine who "got" what was taught and who didn't. For some students this means accepting the evidence that they will never succeed in school. Teachers have also used assessments to record grades to justify report cards. Other teachers have used grades as a weapon to reward and punish students. The young brain internalizes these negative images of assessment and this hardens a fixed mindset in which students feel they are not good enough. Such uses of assessment are not brain-friendly and do not benefit teachers or students. Furthermore, testing creates stress because students feel judged. As was mentioned earlier, stress produces the hormone cortisol which focuses the brain on worrying about the test score rather than the content of the test. This is why a student's test performance is often lower than it would have been without the stress. Furthermore, *timed* tests also produce stress for many students. Resulting cortisol levels often interfere with a student's ability to organize a piece of writing or carry out mathematical operations. While the solution isn't to give students unlimited time, having students answer questions quickly often contradicts what we know about how memory systems are activated. Some students' memory systems are better organized than others and can respond more quickly, but that does not mean they know the correct response any better. If the purpose of the assessment is to determine what a student knows, then we may not get accurate information from a student with a slower retrieval system. While timed tests are appropriate in certain situations, teachers should reevaluate their use in daily instruction.

A More Effective Approach to Assessment for Diverse Groups of Learners

Instead of the above picture of assessment, experts have found ways assessment can be used to improve student performance, not just measure it. In fact, their ideas about more effective assessment practices coincide with the basic tenet of differentiation that it is the teacher's job to support each student as a learner. Below are a few of the effective assessment principles they advocate:

* Targets of classroom assessments are clear to the teacher and the students (what exactly are the criteria for a good piece of writing?)
* Effective classroom assessments measure accurately what they should measure so students can demonstrate what they know.
* Clear communication is used for classroom assessments – clear directions, clear expectations, and clear feedback (not "D" or "86").
* Effective classroom assessment practice leads to improved teaching because teachers refine their instruction based on results.
* *Students* benefit from effective classroom assessments. The assessments help students prepare to succeed by providing them with timely feedback. The assessments help students develop a growth mindset by showing that effort pays off.

Rather than simply seeing assessment as a way to measure what students have learned, educators have classified several different types of assessment that serve different purposes.

Assessment of Learning -- This is the summative type of assessment that occurs *after* the learning has taken place. These can be short-answer tests, essay tests, writing assignments, presentations, authentic problems, or take other forms. While these tests can assess both rote-knowledge and higher-level thinking, most summative assessments in school assess the former. However, brain research shows that the region of the brain that processes rote- versus higher-level skills is *different*. If we want students to develop more of their frontal lobe so they can become problem solvers, we should make sure to include more open-ended, abstract, and higher-level questions on our summative assessments.

Assessment for *Learning* and *Assessment* as *Learning* – These formative assessments focus on student *learning* not *grading*. The purpose is to provide both the teacher and student with information to help them improve their teaching and their learning. Students get specific, descriptive feedback about how to improve and teachers get guidance about how to improve their teaching or better support certain students.

Effective Assessment Practices and Differentiation

In the same way that a high-quality curriculum supports differentiation, so do effective assessment practices. Below are some concrete ways that effective assessment supports the principles of differentiation. Effective preassessment and formative assessment:

- Show teachers which students are behind and beyond the learning expectations – groundwork for differentiation.
- Develop the growth mindset of both students and teachers because these types of assessments help students improve step-by-step as long as they put in effort.
- Strengthen student-teacher connections because teachers receive information from these assessments that shows where students are so they can support them along their path toward success. Students experience more feelings of success and optimism because teachers know more about them and help them to meet their goals.
- Provide information about student readiness, interest, and learning profile so teachers can differentiate in these areas.
- Are rarely graded because they are used to help students practice and improve.

Chapters 5, 6, and 7:
Differentiating in Response to Student Readiness, Interest, and Learning Profile

I. What It Means to Differentiate According to Student Readiness, Interest and Learning Profile

READINESS

A student's *readiness* has to do with how close he or she is to the knowledge, skills, or understanding required for a learning goal. For example, if one second grader can't write a coherent sentence, then she is not yet ready to write paragraphs in comparison to another second grader who loves writing stories in her free time and who might be well beyond the skill of writing paragraphs. It is important to note that *readiness* is NOT the same as *ability*. For example, a student who struggles with some verbal areas might be advanced when learning about the Civil War because he and his father love this topic. Also, readiness changes from topic to topic and is not fixed. To maximize learning, it is best to provide a student with a learning task that isn't too easy or too hard but rather is just beyond the student's reach, and then provide the student with the necessary support. Research in cognitive psychology and neuroscience supports this idea that students learn better and actually feel better when classroom tasks are at their levels of readiness. For example, a learning task that is too difficult often produces stress (the results of which were discussed earlier). On the other hand, new tasks at the appropriate level of challenge often stimulate the reward-processing areas of the brain which release dopamine which leads to increased focus, memory, and motivation. For this reason, it is important to differentiate according to student *readiness*.

INTEREST

Interest has to do with feelings that cause an individual to pay attention to something because it matters to that person. Certain topics, events, or instances may draw in a person's attention and concentration. Research in cognitive psychology and neuroscience show that interest-based study leads to more student engagement, a more positive student-focused environment, more persistence on the part of students, and better connections between student and teacher. Furthermore, neuroscientists have found that the behaviors associated with interest – namely motivation – lead to greater attention and a willingness to learn. For these reasons, it is beneficial for teachers to differentiate not only according to readiness, but also according to interest.

Note that differentiating instruction according to interest does *not* mean that all lessons must address all students' interests all the time, nor does it suggest that content is secondary to student interest. What it *does* mean is when teachers know their content and their students' interests well, they can find many opportunities to boost learning by linking the content with what matters to their students.

LEARNING PROFILE

A *learning profile* describes how a student learns best. For example, while some students learn more easily on their own, others prefer to learn in a group. Research has shown that there are four areas that affect one's learning profile as outlined below:

(1) **Learning Styles** – a number of theorists have proposed different learning style models, but the best known (Kenneth and Rita Dunn's) suggests that students have environmental, emotional, sociological, physiological, and psychological preferences for how they learn. Some examples include lighter vs. darker environments, silence vs. noise while working, highly structured vs. open-ended tasks, listening vs. touching to learn, and more (see pages 138-139 for more).

(2) **Intelligence Preferences** – One of the best known intelligence preference models – Howard Garner's – suggests that individuals have strengths in different intelligence areas such as verbal, logical, visual, musical, bodily, etc. (See p. 140.)

(3) **Culture** – Culture also influences how students learn. While it is important not to generalize about an entire culture, it is helpful for teachers, who are mostly Caucasian, to become more culturally aware of their increasingly diverse student bodies. Non-Western or non-Caucasian students may learn better in classrooms in which the group is valued (more than the individual), students can collaborate (rather than always working individually), and where social skills are emphasized (not always cognitive skills). (See pp. 141-143 for more information about culture and learning profiles.)

(4) **Gender** – Gender also influences student learning. Again, while individual variance exists, it helps to take into account gender-based learning preferences. For example, girls listen better and boys are more attuned to motion. Boys are more attracted to competition while girls like collaboration. Girls excel in verbal tasks and boys at spacial ones. (pp.143-146)

While the research on learning profile is more limited and controversial, we *do* know that students benefit from a range of approaches to both teaching and learning.

II. Some Guidelines for Differentiating in Response to Readiness, Interest, and Learning Profile

In addressing the variety of student needs, teachers will need to consider the different classroom elements – mindset, learning environment, curriculum, assessment, instruction, and classroom management. Each of these classroom elements has a role in differentiation.

Mindset – Having the right mindset helps teachers successfully differentiate for readiness, interest, and learning profile. For example, it is important not to see readiness differentiation as giving some students more work than others or to understand readiness as ability. It is also important in thinking about learning profile not to put students in a box (she's a visual learner) and not to teach with only one approach (e.g., always lecturing). Both students and teachers need to understand that all students approach learning differently and to be aware of and appreciate these different approaches.

The Learning Environment – Student learning will be best supported in an environment in which students feel safe and supported. This is an environment in which students are challenged at the right level (*readiness*), and believe that the teacher understands, respects, and takes an interest in the students' interests and learning profiles.

Curriculum – The curriculum is made up of what students need to know (K), understand (U), and be able to do (D). Differentiation will be enhanced if teachers know the continuum of KUDs well enough to understand where students are on that curriculum and the steps necessary to bring students to the appropriate level of competency. Learning will also be more effective if the teacher can find ways to connect student interests with the curriculum and match aspects of the curriculum with different learning profiles.

Assessment – Assessments provide key information to teachers to help them differentiate. Preassessments can be used to determine student readiness as well as student interest and learning profile. Teachers should give a preassessment to learn what students know, understand, and can do so they can better plan a unit. They should also assess student readiness in reading, writing, and listening, even for the upper grades. Teachers also can give students a survey to find out about their interests (asking what they do in their spare time and which subjects they like – see p.122 for a sample) and a learning-profile preassessment (asking about the ways students learn best – see p.151 for a sample).

Instruction – Instruction will be addressed in the section below.

Classroom Management – Differentiated instruction means that different students will be working on different tasks with different materials some of the time. In order for this to be successful, the teacher needs to establish the type of routines so students know how to move around the room, get materials, get help, and keep track of their own work. This allows teachers to work with individuals and small groups to address their varying needs, interests, and learning styles.

III. More Specific Suggestions for Differentiating Content, Process, and Product

Below are some more specific suggestions for ways teachers can differentiate based on content, process, and product.

Content – Content is what we teach and how students get access to it. It is preferable to differentiate the latter – *how* students get access to the curriculum rather than the curriculum content itself. For example, a teacher can put a book on tape for students having great difficulty reading text. However, there are times when it is appropriate to differentiate the content such as when a seventh grader spells on a second-grade level. Here are some brief suggestions for how to differentiate content:

- Assign differentiated homework (*readiness*)
- Use materials at multiple reading levels (*readiness*)
- Add demonstrations to a lecture for students who benefit from seeing concrete applications of abstract ideas (*learning profile*)
- Bookmark a university-level website for students at a readiness level beyond the grade-level text (*readiness*)
- Include examples, analogies, stories, and applications that you know will interest students (*interest*)
- Provide resources (books, videos, websites, podcasts, etc.) that relate the content to student areas of interest (*interest*)
- Examine your own preferred mode of teaching (e.g., lecturing) and try to expand the modes in which you present information to include visual and auditory presentations, demonstrations, small group work, and other modes (*learning profile*)
- Introduce perspectives from different cultures and genders (*learning profile*)
- Address a variety of learning modes. For example, provide graphic organizers (for visual learners) and podcasts or other recordings (for auditory learners). (*learning profile*)

Process – Process includes the activities students do to make sense of the material.

- Use instructional strategies that address *readiness* such as providing different reading materials matched to reading levels.
- Give students time to share their *interests* and make sure to record them (perhaps on index cards to help plan future instruction).
- Use a variety of student groupings based on both similar and dissimilar readiness levels, interest, or learning profiles (*all*)
- Increase or decrease the complexity of the task even though the outcomes remain the same (*readiness*)
- Have students collaboratively solve a problem instead of working independently (*learning profile*)
- Increase or decrease the number of variables or facets in the task (*readiness*)
- Frontload or preteach vocabulary to students with weak vocabulary skills (*readiness*)
- Find opportunities for students to share ways essential understandings and skills apply to their interests (*interest*)
- Share your own experiences as a learner and what helps you to learn (*learning profile*)
- Provide a choice for the way students can work (alone, in pairs, with the teacher, etc.) (*learning profile*)
- Give students options for how to work on learning tasks (write a paragraph, create a flow chart, etc.) (*learning profile*)
- Provide places in the room where those students distracted by noise or visual stimuli can work (*learning profile*)
- Vary the types of tasks you give – both competitive and collaborative and both concrete and abstract (*learning profile*)

Product – Products are how students show what they have learned.

- Provide more check-in dates for some students (*readiness*)
- Provide more- and less-complex resources for students based on readiness levels (*readiness*)
- Have students set personal goals for their products based on their readiness levels (*readiness*)
- Encourage independent studies in which students apply and extend key content in areas of their interest (*interest*)
- Provide a variety of modes of expression for student products (written, visual, auditory) (*learning profile*)
- Be flexible with time parameters for student products when possible (*learning profile*)

IV. A Closer Look at a Few Strategies to Differentiate for Readiness, Interest, and Learning Profile

Two Commonly Used Strategies to Differentiate for Student READINESS

Learning Contracts – Learning contracts outline the key knowledge, skills, and understanding for a unit and focus on a student's areas of greatest need. All contracts may have the same format but the items differ by student. The chart includes a plan for the work the student will complete. The tasks differ for each student and can target each student's level of readiness. (See p.102 for a sample.)

Tiering – Tiering is when teachers create two versions of a task. The content is the same but there are varying degrees of difficulty that provide an appropriate challenge for students on different levels. Both tiers are interesting and require thinking and reasoning, but one might be more abstract and open-ended. Teachers can use tiers for learning centers, journal prompts, products, problems, labs, homework, and assessments. (See pp. 103-4 for sample tiered assignments.)

Two Commonly Used Strategies to Differentiate for Student INTEREST

Expert Groups – Groups of students with a common interest work together to learn more deeply about a certain aspect of a unit of study and then help the teacher teach the class about it. The teacher generates topics that are of interest to students and then the students choose to join one expert group. (See p.128 for an example of expert groups.)

Sidebar Studies – Students conduct a study, related to the required curriculum, outside of class time. Usually these are conducted by individual students and last two to three weeks. For example, in one middle school the math teacher asked students to find an adult whose hobby or job seemed interesting and who relied on mathematics as an integral part of what they did. Students found a wide variety of people from athletes and musicians to engineers. (See p.129 for an example of a sidebar study in mathematics.)

Two Commonly Used Strategies to Differentiate for Student LEARNING PROFILES

Synthesis Groups – The teacher puts together four students with different approaches to learning in a group in order to develop a deeper understanding of what they have been learning. They discuss the meaning of the content the class has been working on and then must express that meaning in at least three different modes (such as visual analogy, model, monologue, sketch). The goal is to clearly present the essential ideas in the unit and help classmates understand the content more deeply. (See p.158 for an example.)

Thinking Caps – Groups of students consider an open-ended problem or issue by putting on one of five "thinking caps." The thinking cap represents the thinking style with which they must approach the problem (blue cap values facts, yellow trusts feelings, green is creative, orange is practical, and red looks for flaws and is cautious). The goal is to approach a real-world problem in a variety of ways and to help students understand and value different approaches to thinking. (See p.160 for an example of Thinking Caps.)

Chapter 8: Managing a Differentiated Classroom

An Alternative View of Classroom Management – The Orderly-Flexible Classroom

Teachers who want to differentiate to support each learner need to *manage their classrooms* in a way that supports this. However, the idea of having different students working on different activities is daunting to many teachers. It's certainly easier to have all students working in lockstep because many teachers have anxiety about controlling their students. These classrooms are run in what may be called an *orderly-restrictive* way in which routines are tight and the teacher uses a limited repertoire of teaching strategies which often focus on lower-level tasks that are more easily controlled. However, this approach limits what students can learn and this one-size-fits-all approach does not support the needs of each learner.

Instead, in a differentiated classroom teachers use an *orderly-flexible* approach in which classrooms run smoothly but structures are looser (not loose). The goal is to support *flexibility* of teaching and learning structures not to support *rigidity*. These classrooms allow for a wider range of learning structures (small groups, individual learning) and are brain-friendly because of the low-threat, high-challenge environment that also encourages communication. Research from neuroscience shows that students in flexible learning environments show more creativity, learn more vocabulary, and have improved problem-solving skills. Furthermore, the *orderly-flexible* learning environment supports the principles of differentiation because it reinforces the teacher's growth mindset, a respect for individuals, a focus on individual student understanding, and a determination to do what it takes to support individual student success.

Setting the Tone for the Orderly-Flexible Classroom

Some students are not used to a differentiated classroom with an orderly-flexible environment and the teacher will need to set the appropriate tone. There are a number of actions teachers can take which will send the message to students that they can and will learn and that the teacher wants to connect with them. Research shows that the single most important factor in classroom management is a positive relationship between the teacher and the students. Some suggestions for the teacher include:

- quickly learning students' names and how to pronounce them correctly
- using interest, learning-profile, and other surveys to learn about students as individuals
- standing at the door to connect briefly with students as they enter
- paying extra attention to students who are often overlooked
- allowing a few minutes during class for teachers and students to share stories and experiences
- checking in with individual students during class to make sure they have what they need
- determining what challenges individual students and showing appreciation when they persist

Helping Students Learn About Their Learning Differences, Differentiation, and the Class as Whole

Before differentiating, it is important for everyone to understand *why* the class is operating the way it is and *how* it should proceed. Therefore, to get students thinking about these issues teachers should conduct conversations with students to discuss:

- Who are you as an individual and who are we as a class?
- How are we alike and different in our interests, needs, and strengths?
- What kind of class will it take for us all to learn effectively? What kinds of rules, routines, and ways of working will we need so each student succeeds as a learner?

One way to begin to address these questions is to help students examine their own learning differences. Below are two strategies that can help them to better understand themselves.

1. *Graphing Your Strengths* – Give each student a chart to graph his or her strengths. Along the horizontal axis include aspects of the subjects you will be teaching (writing, reading, working hard, drawing, etc.) and then on the vertical axis, students rate themselves (younger students can use pictures from a frowning face at the bottom to a face with a huge smile at the top).
2. *Paper People* – Give each student a 10-inch cutout of a person. Then give directions for coloring the person to represent how the student likes to learn such: If you like math best, color the shirt green; if you like science best, color it yellow; if you like to work alone, put stripes on your shirt; if you like to work with a partner, put dots on your shirt; if you learn best by listening, make your shoes white; etc. Students then post their figures on the board and try to find figures that are exactly alike. There are usually very few or none.

Then, once students are more aware of their own learning differences, teachers should get students to discuss how the class should operate to meet all of these various needs. In this discussion, the students often come up with ideas such as: students might need to learn things in different ways, students might need to work on different activities at the same time, students might need to read different texts, the teacher may need to work with individuals or groups of students, etc. These types of discussions help prepare students to understand why the teacher is differentiating instruction.

Strategies That Support the Orderly-Flexible Classroom

In order to effectively proceed with a flexible or differentiated classroom, teachers should consider the following guidelines:

• *Use Anchor Activities* – Because students do not finish assignments at the same time, anchor activities are assignments students automatically know to begin when they finish their initial assignment.

• *Set Basic Parameters* – Certain expectations benefit the differentiated classroom. It is critical to have certain procedures in place before differentiating. For example, students should know how to: move about the room, use the appropriate noise level, when the teacher is off-limits for questions, how to handle materials, the routines for handling paperwork, and how to function within a group.

• *Develop Methods for Assigning Groups* – In a successful differentiated classroom, students work in a variety of groups. Teachers need efficient ways to assign students to groups such as using an overhead projector, a task chart, a room chart, or preassigned groups.

• *Develop Methods for Giving Directions for Multiple Tasks* – In order for flexible grouping to be successful, students need to know exactly what to do and what quality work looks like. When multiple directions for different tasks are needed, teachers can place tasks cards in various areas in the room, appoint student "direction providers," or audio record directions for a small group.

• *Develop Methods for Students to Get Help When the Teacher is Busy* – Students need to learn to ask questions when instructions are given, rely on peers or an "expert of the day" for help, and refer to model student work when the teacher is busy.

The authors hope that after finishing the book, readers will take the steps to make their classrooms effective for all kinds of learners.

Professional Development Suggestions from the Book: Reflecting on and Implementing Differentiation Strategies

There are so many ways to introduce the ideas behind differentiation to teachers, school leaders, and other educators. Fortunately the authors provide questions for reflection at the end of each chapter as well as suggestions for implementing the strategies introduced in the chapter. See the book for the entire list of questions and suggestions and an excerpted version is below.

I. At a faculty meeting have teachers respond to the following questions. Then have time for reflecting on whether teachers should make any changes to their instruction to better meet students' varied needs. Also consider how well the school as a whole is progressing in working toward successfully differentiating. Note that answers to these questions can help highlight the aspects of differentiation for which teachers need more professional development.

QUESTIONS TO HELP FACULTY REFLECT ON THEIR USE OF STRATEGIES TO DIFFERENTIATE
STUDENT READINESS • Do you understand the difference between ability and readiness? • Do you have a preassessment that checks for prerequisite knowledge? Will you have time to plan based on the results? • Have you done a check of student readiness in reading, writing, and other fundamental skills necessary for the topic? • Have you made plans to extend the learning of students showing initial mastery on the essential learning objectives? • Are you using student work time to meet with or teach small groups and to monitor student work and progress? • Will you use regular formative assessments to address students' varied readiness needs?
STUDENT INTEREST • Have you thought about potential high-interest areas in your subject or unit and built those ideas into the curriculum? • Have you developed and administered a student-interest survey? • Do you engage students in conversations about their interests and have a systematic way to record what you hear? • Do you use examples from students' lives and interests? • Do you use interest-based strategies such as sidebar studies, expert groups, learning centers and other interest-based approaches?
STUDENT LEARNING PROFILE • Have you developed and administered a student learning-profile survey? • Do you provide a range of working arrangements and environmental adaptations (such as quiet or space to move) in the classroom? • Do you provide a range of learning profile-based practice, product, and assessment options? • Do you help students understand what is working for them as learners, what is not, and how to adjust?

Based on answers from above, what possible changes might we consider? How is our school progressing with differentiation?

II. Below are suggestions to differentiate content, process, and product. Brainstorm other activities that might also be appropriate.

SUGGESTIONS TO DIFFERENTIATE CONTENT, PROCESS, AND PRODUCT
CONTENT • Provide students with reading difficulties a text that has the essential passages highlighted. (*Readiness*) • Use small-group instruction targeted at members' readiness levels. (*Readiness*) • Ask a student who is struggling to meet with two reading groups a day instead of one. (*Readiness*) • Offer books on a variety of topics that relate to the essential content. (*Interest*) • Have experts make presentations on the essential content in ways that will interest students. (*Interest*) • Ensure that resources reflect a variety of cultures and backgrounds. (*Interest*)
PROCESS • For students who don't fully understand the concept of fractions, use manipulatives. (*Readiness*) • Model a task for English learners who struggle with written directions. (*Readiness*) • Increase or decrease the number of practice opportunities for a given skill based on readiness needs. (*Readiness*) • Use interest centers around topics that appeal to students. (*Interest*) • Use expert groups or jigsaw groups that allow students to specialize in an area of particular interest. (*Interest*) • Use contemporary resources to support essential content. (*Interest*)
PRODUCT • Ask some students to apply a skill to a familiar context and more advanced students to apply it to an unfamiliar context. (*Readiness*) • Give some students who have difficulty with timelines a planner. (*Readiness*) • Provide models of effective student work at different levels of sophistication to match readiness levels. (*Readiness*) • Enable students to use contemporary media as tools to demonstrate knowledge, understanding, and skills. (*Interest*) • Have students propose product options in relevant areas of personal interest. (*Interest*)

In addition to the activities above, what other additional activities might we use in our classrooms?