

Excerpted from

Differentiating Instruction with Technology in Middle School Classrooms

Grace E. Smith and Stephanie Throne

All students have different interests, backgrounds, learning styles, and ability levels. The best teachers recognize this and provide students with a tailored education to ensure their students a successful future. Technology enables educators to differentiate instruction more effectively, efficiently, and easily. This book highlights the importance of differentiated instruction (DI) in middle school, and shows teachers how to make DI a reality through sample activities, recommended strategies, and suggestions for relevant Web 2.0 tools.

Chapter 2 of *Differentiating Instruction with Technology in Middle School Classrooms* provides an overview of DI and strategies for differentiation before diving deeper into why DI is so important for the middle school age group. The authors wrap up the chapter with a discussion of the importance of the learning environment and strategies for creating a classroom that is conducive to DI.

CHAPTER 2

Differentiated Instruction and Middle School Learners



Differentiated instruction continues to play a significant role in digital age classrooms. Due to its focus on modification of instruction for student diversity, student accountability for learning, and constructivist (student-centered) learning, differentiated instruction provides the flexibility teachers and students need. The curricular elements at the core of differentiated instruction (content—input, process—throughput, and product—output) mirror and marry nicely with technology. In addition, technology can assist us in our effort

to engage students and personalize instruction according to students' interests, levels of readiness, and learning styles (the three primary student traits that guide differentiation). We'll share more about differentiated instruction in the next chapters as we challenge you to transform your classroom through the use of technology, not simply layer technology onto traditional instructional practices.

Overview of Differentiated Instruction, Student Traits, and Curricular Elements

Differentiated instruction (DI) is a way of looking at instruction that is centered on the belief that students learn in many different ways. It could be considered as a collection of best practices from gifted, special, and traditional education, but it's not really a new model. Back in the days of the one-room schoolhouse before the term was coined, teachers had to differentiate instruction for a range of ages and grades with no modern technology.

DI supplies teachers with a flexible framework that offers multiple learning approaches to meet learners' needs. It provides for an extensive array of instructional and management strategies to assist us in our effort to reach our very diverse learners. Within today's classrooms, we encounter an astonishing range of interests, levels of readiness, and learning styles, not to mention myriad cultural and familial differences that shape our students' social and learning personalities. DI recognizes and honors academic, cultural, and familial diversity. DI practitioners attend to that diversity and also meet curricular objectives via modification of instruction. Teachers, however, don't shoulder all of the responsibility for student learning and achievement; students are highly engaged and accountable.

As new trends and tactics are constantly emerging, you may wonder why differentiated instruction continues to be an influential educational approach in tomorrow's classrooms. This list of the fundamental components of differentiated instruction illustrates DI's value.

- DI encourages the modification of instruction to address student diversity and to meet curricular objectives.
- DI emphasizes student accountability for learning and high levels of participation via flexible grouping and simultaneous activities, such as Jigsaw and WebQuests.
- DI features group-driven tasks but also relies upon whole-class and individualized instruction to complement group work. It focuses on the quality of activities versus the quantity of work assigned.
- DI promotes a comfortable yet challenging learning environment. Teachers realize that their organization and presentation of content profoundly affects students' motivation to learn and their perceived ability to comprehend. Inspired students feel safe in their learning communities and are intrigued by the subject matter at hand.
- DI depends upon pre-, formative, and summative assessments that utilize both traditional and nontraditional evaluation methods, such as teacher observation, self-assessment, and project work.

- Teachers who apply DI concepts show a willingness to learn more about their students and to modify instruction to support students' needs. As a result, using surveys and other tools to learn about students is important.
- DI is guided by the constructivist or student-centered approach to teaching and learning. Constructivism, one of the big ideas in education that arose during the early 1990s, is the belief that students create or construct their own knowledge and understanding by building on previous learning. Constructivist learning is active rather than passive. Constructivist teachers relinquish their traditional role of "sage on the stage" (the omnipotent keeper of knowledge) to become the "guide on the side" (the facilitator of experiences and opportunities for students to learn).
- In student-centered classrooms, planning, teaching, and assessment are focused on the needs and abilities of students. Why? Because constructivists believe learning is most meaningful when topics are connected to students' needs and interests, and when the students themselves are actively engaged in creating, understanding, and connecting with knowledge. Students are motivated to learn when they feel they have a real share in their own learning. In a student-centered classroom, students are given options and are included in decision-making processes. The focus in these classrooms is on choices, rather than on one size fits all. Students are regarded as individuals with ideas and needs that merit consideration and thoughtfulness.
- DI practitioners make instructional decisions based on students' readiness, interests, learning profile, and affect; the learning environment; and the curricular elements of content, process, and product.

Now that we've shown DI's promise for longevity, let's examine the student traits and curricular elements that guide differentiation, as well as some common strategies that you might use for each. Please note that the ideas in Tables 2.1 and 2.2 are not an exhaustive list of strategies! (We will leave our exploration of student affect and the learning environment until later on in the chapter.) Differentiation of one or more of these essential curricular elements or student traits, translates into multiple learning approaches that will benefit students.

TABLE 2.1 ■ Definition of Student Traits and Possible Strategies for Differentiation

Readiness What students know; current preparedness	Interest Students' curiosities or passions	Learning Profile Preferred way to learn (shaped by intelligence, learning style, cultural-influenced and gender- based preferences)
Tiering	R.A.F.T. (Role, Audience, Format, Topic) and R.A.F.T.T. (Role, Audience, Format, Topic, and Technology)	Activities based on multiple intelligences theory
Curriculum Compacting	WebQuest	Tic-Tac-Toe or Choice Board
Varied Graphic Organizers	I-Search	Activities based on cognitive styles (auditory, kinesthetic, tactile, visual)
Learning Contracts	Jigsaw	Stations or Centers
	Stations or Centers	Various options based on interest or readiness

TABLE 2.2 ■ Definition of Curricular Elements and Possible Strategies for Differentiation

Content What is taught and learned (input)	Process The activities students do to make sense of ideas, concepts, and information (throughput)	Product The assessments or demonstrations of learning, such as the artifacts students produce (output)
Curriculum Compacting	Flexible Grouping	R.A.F.T. or R.A.F.T.T.
Learning Contracts	Cubing	Tic-Tac-Toe or Choice Board
WebQuests	ThinkDots	Numerous options based on interest
I-Search	Jigsaw	Numerous options based on readiness
Centers or Stations	Centers or Stations	Numerous options based on learning profile

In case you might not be familiar with some of the strategies referenced above, see Appendix A, Glossary of Strategies at the end of the book that briefly describes each one. In the remaining chapters of this book, we'll implement some of them in our suggested classroom activities, so you'll come upon some of these old friends again.

Whether you're an experienced DI practitioner or a novice, you are special because you work with what many believe to be the most difficult age group of students. If you are experienced, we're certain that you've witnessed firsthand the benefits of incorporating differentiated instruction into your classroom. Let's turn for a moment to the unique nature of middle school learners, who face a series of social, emotional, and intellectual changes. Can you anticipate why DI might provide the best approach for students at this level?

The Inner Workings and Complexities of the Teenage Brain

Emotional, Physical, and Intellectual Development and How They Impact Middle School Learners

Students in eighth grade often vary in appearance and maturity. One member of the football team might be 6 feet, 6 inches tall and weigh 180 pounds, a member of the wrestling team might be 5 feet tall and weigh 85 pounds. Another peer who plays on the football and wrestling teams might be 5 feet 9 inches tall and weigh 280 pounds. Talk about disparity! This example illustrates the huge variety that exists solely in the physical stature of our middle school students. On a daily basis, you also witness a wide range of diversity in their social, emotional, and intellectual levels of development. We are only beginning to understand the reasons for the unique behavior that our middle school students demonstrate, as well as the different paces at which they mature socially, emotionally, and intellectually. We usually have from 45–50 minutes, five days a week, to reach the young teens in our classrooms. Not only is there a great deal of academic ground to cover, but there's also a whole lot of psychology going on. In order to connect with our students intellectually, we need to understand and appreciate them emotionally and socially. Therefore, we'd like to explore some of the research on the teenage brain and the social, physical, and emotional development of adolescents.

In 2000, PBS aired a documentary about the teenage brain called "Frontline: Inside the Teenage Brain." You may view it online and see the great resources associated with the program at www.pbs.org/wgbh/pages/frontline/shows/teenbrain/. Other organizations, such as the National Middle School Association (NMSA) and the National Education Association (NEA), have published information about the teenage brain and how it affects learning styles, personalities, and behavior in the middle school classroom. Frontline's documentary describes a study in which teens and adults were asked to identify the emotions expressed on several pictures of faces, and neuropsychologists monitored how their brains responded to the photos via MRI images of the participants' brains. Even the medical practitioners were stunned that the teens had trouble identifying some of the emotions correctly (fear in particular) and that they used a different part of the brain to do so. The adults relied on the frontal cortex, which is known as the CEO of the brain, as it is the organizer, planner, and mood controller. The teens, however, utilized the amygdala,

which is responsible for directing instinctual or gut reactions. It's found in the lower part of the brain and is considered to be "inferior" to the prefrontal section. The neuropsychologists concluded that the frontal cortex was not yet functioning at full capacity in the teen brain, resulting in teens' greater impulsivity, risky behavior, and a failure to think through possible consequences before acting. Furthermore, they discovered that the males' reactions were much stronger than the females' (PBS, 2002c). Based on the personalities in your classroom, do these results surprise you?

Further research has shown that the brain grows during the teenage years. Although 95% of the brain's structure is complete by age five or six, the brain experiences additional growth just before puberty. The growth occurs just behind the forehead in the prefrontal cortex, the portion of the brain mentioned previously. Once the growth phase is over, the brain turns to "pruning" of synapses. In other words, gray matter is lost, but myelin is wrapped around the most-used connections to strengthen them. The most daunting aspect of this whole process is that what our teens do at this time of growth can affect them forever. For example, if they use connections for sports and drama, those will be strengthened, but those for music and art may be pruned back. The connections they prefer and use most frequently (even if they're not so positive, such as those for TV viewing and playing couch potato) are hardwired to stick around, but those they ignore or fail to develop will fall by the wayside and literally die. This phenomenon is called the "Use It or Lose It Principle," coined by Jay Giedd, a neuroscientist at the National Institute of Mental Health who was a part of the *Frontline* show. Teens tend to tune us out at times about major issues, such as drugs and alcohol, but the research described above only underscores the fact that dangerous substances can do nothing but harm the growing brain and have lasting effects (PBS, 2002b).

The "Use It or Lose It Principle" also applies to the cerebellum (at the base of the brain—at the back of the head just above the neck), which changes more than any other part of the brain during adolescence. The cerebellum supposedly aids physical coordination, but scientists have found out that it also helps the brain process mental tasks that require higher order thinking—even those involving a teen's social skills. This section of the brain appears to be much more sensitive to environmental stimuli because it's not controlled by genetics (PBS, 2002b).

The corpus callosum is yet another section of the brain that undergoes growth during puberty. The corpus callosum transmits information between the hemispheres of the brain via a series of fibers. The fiber system that shapes language learning and associative thinking grows more quickly than those of proximate regions both before and during puberty. However, that rapid phase of development declines rather abruptly. For all of you language teachers (including me, Stephanie) who have been encouraging students, parents, and administrators to start language learning at a young age, we were right! It's much more difficult to begin learning a new language after age 12 (PBS, 2002a).

Interestingly, we viewed a video posted on Edutopia, "The Heart-Brain Connection: The Neuroscience of Social, Emotional and Academic Learning" (www.edutopia.org/richard-davidson-sel-brain-video/). In this video, neuroscientist Richard Davidson (2007)

echoes the notion of brain plasticity (changeability) that was publicized in the Frontline program on the teenage brain. Like Giedd, he maintains that there are “more sensitive periods” when the brain might be less plastic than others, and he believes that its plasticity never disappears completely. Studies that Davidson has conducted on the brain speak volumes about the influence of affect, the fourth DI student trait, which is how students feel about themselves, their work, and the classroom. Just to clarify, we hear a variety of terminology related to affect, such as affective domain or emotional intelligence and social and emotional learning (SEL). It is not our intent to devote many pages of text to comparing and contrasting these theories or relationships, but here are a few working definitions with some brief background:

Emotional Intelligence

Defined by psychologist and author Daniel Goleman (1995)

Per Goleman: emotional intelligence is “the capacity for recognizing our own feelings and those of others, for motivating ourselves, and for managing emotions well in ourselves and in our relationships.” (1995, in Edutopia, 2001a)

Affective Domain

Defined by David R. Krathwohl, Benjamin S. Bloom, and Bertram B. Masia (1964)

Best known as Krathwohl’s Taxonomy of Affective Domain, a part of Bloom’s Taxonomy of the three domains of educational goals and activities.

Karin Kirk quotes Krathwohl et al. on affective domain: the “learning objectives that emphasize a feeling, tone, an emotion, or a degree of acceptance or rejection.” (1964, in Kirk, 2007)

Social and Emotional Learning (SEL)

More of an outgrowth of Goleman’s book (*Emotional Intelligence*), Gardner’s book (*Multiple Intelligences*), in addition to educational research on prevention and resilience.

Zins and Elias (2006) define SEL as the “capacity to recognize and manage emotions, solve problems effectively, and establish positive relationships with others.”

We have read studies about how SEL programs have decreased violence in schools, improved test scores, increased cooperation and unity, and strengthened emotional control. (See, for example, “Emotional Intelligence Research: Indicators Point to the Importance of SEL” (2001b) at www.edutopia.org/emotional-intelligence-research/ and “Emotional Intelligence: The Missing Piece” at www.edutopia.org/emotional-intelligence-missing-piece/.)

Davidson shares in his presentation (2007) that if we invest time in SEL, not only do we impact the affective domain, but we impact brain function and structure. Training students to respond in emotionally and socially appropriate ways actually affects concrete brain circuits, particularly those in the prefrontal cortex (something that medication is unable to do as effectively). In addition, SEL reduces the production of the stress hormone, cortisol, which is beneficial for the body and the brain. When there is a high level of

cortisol in the brain due to anxiety, working memory is disrupted. If students can learn effective, calming responses to negative emotions, they improve cognition. Moreover, what many have considered as inherent traits or characteristics in the past, such as kindness, patience, and calmness, can indeed be developed in students as skills via this form of character education.

How do these developments in the teen brain's structure manifest themselves in students who enter through the doors of our classrooms for a mere one to three years, depending on the grade levels and subjects we teach?

In terms of anatomical development, we've learned that 11- to 16-year-olds go through rapid physical changes, similar to what they experienced during infancy. At no other stage of human development will such extensive physiological changes occur in such a short period of time. Peter Lorain explains that young teens endure the hardening of the skeletal structure (tailbone included), which often results in sciatic nerve pain if they are forced to sit for a long period of time. Muscles are stretched to the limit because bone growth exceeds muscle growth, so students literally feel "growing pains." The stomach actually increases in length and activity, so our students are hungry all the time, and the body needs that food to help with the other areas that demand energy for growth. The hormones that have already begun to rage through some bodies manifest themselves in acne, physical awkwardness, and distraction. As you might expect, there is no way to predict exactly when a teen will develop. Girls mature earlier than boys, but both genders experience different rates of change, and those changes are taking place sooner than in times past (Lorain, n.d. a).

When we think about challenges that present themselves in our classrooms, one that you might mention has to do with noise control. Our middle schoolers are constant chatterers and like to get in the last word, especially if a friend has made a wisecrack that demands a reply. We often forget that talking affords them the chance to work through the developmental and social experiences they're tackling. It's no secret that adolescents feel a strong need to belong to a peer group. In fact, their friends' opinions frequently matter more to them than those of their parents or teachers. Nonetheless, they seek and definitely need at least one adult in whom they feel they can safely confide. They feel comfortable testing out different roles or identities within a group, but they will conform in order to avoid rejection. This intent to conform is particularly evident in forms of dress and behavior, which can appear rather questionable or drastic at times. Our initial reaction is to scold them or judge them, but what they really need is the exact opposite. If we do not allow them the time and the space to come to grips with their own identities, they'll continue or escalate the behavior, unusual clothing, hair style, or anything else for shock value (Lorain, n.d. b).

Though teens seem to be more apathetic than passionate, more cruel than kind, such is not the case. During the middle school years, adolescents begin to contemplate moral issues, such as right versus wrong, social injustice, and inequality between the quality of life of various cultures or peoples. Take advantage of these budding concerns by constructing hands-on tasks, such as a community service or school improvement project,

interviews of community leaders, letters to trigger change or protest unfairness, or some type of communicative exchange with middle schoolers in another state or country. When we extend our lessons beyond the classroom walls in a way that's relevant to our students, we deepen our connection to them, and help our students to cement key information into long-term memory.

The Learning Environment

A Critical Component for Success

Learning environment, the management or climate of the classroom, is DI's fourth curricular element, and it's a bit more difficult to manipulate than the other three. It is an extremely vital yet somewhat more intangible DI curricular element. Obviously, the learning environment is an actual, physical place. When we think about the learning environment as a curricular element, however, we are referring to the classroom climate, which we often measure in subjective terms. The learning environment, as you know, exerts a huge influence on our learners, so it's essential to cultivate a healthy one and monitor it vigilantly. However, it's inherently subjective and, as scholars Adelman and Taylor (2005) point out, founded on perception: "classroom climate is a perceived quality of the setting." As we have multiple students in the classroom, we might have 25 or 30 disparate assessments of the classroom climate. What we do know is that our middle school students thrive in a task-oriented classroom with active learning, flexible groups, peer tutoring, focus on improvement, room for mistakes, and, of course, technology. Because the fear of failure is particularly intense at this age level, the traditional, performance-oriented classroom wherein grades, test scores, and correctness reign supreme is not always the best fit (Maddy, 2008). Unfortunately, it's pretty commonplace. We persist with our mantra that student choice, whenever possible, is empowering, as it fuels motivation and achievement. In addition, activities that supply ample opportunity for the exploration of personal interests are of the essence. Old curiosities quickly fade, and new interests replace them, so continue to assess throughout the year. Whatever the current trend may be, your middle school students will express intense passion about it, intensity unmatched by any other age group.

Although learning environment is largely based on perception, we can change the physical surroundings and our own teaching styles to effect a positive change for our students. The three additional curricular elements, content, process, and product, enable many more concrete strategies for differentiation; nonetheless, the learning environment is something that we must attend to in order to differentiate effectively.

Time allotment in middle school class periods does not truly accommodate or enhance community building, nor do the social, intellectual, and emotional challenges that your adolescent students undergo. For those two reasons in particular, it is even more vital to dedicate time and energy to fostering a safe learning environment. My (Stephanie's) classroom personality tends to be somewhat strict, particularly at the beginning of the year,

and then I ease up as I see fit. I find it's much more difficult to toughen up with students if you've started off too leniently. My students know my expectations and classroom policies—even my college-age learners. However, rigor does not mean exclusion. Involving students in decision making is empowering. If students genuinely feel a part of the process, they just may be more respectful of your rules and of their classmates. In other words, if you value their input, they might give more weight to yours. Second, students recognize that you are presenting them with an opportunity that does not come around too frequently in other classrooms, so something is at stake. If they are fearful or troubled by particular aspects of the learning environment, they have a chance to address those issues via the avenue you've made available to them. If you begin by including students, you set a tone for the classroom environment that is key to future success, particularly for collaborative projects. It does not ensure that your classroom will be totally free of conflict, but a set of common values and practices decided upon by all (the democratic process at work) is powerful. Furthermore, it may help to minimize the unattractive features of middle school learning in your classroom, such as bullying, unkindness, and disrespect, which consume precious learning time and have negative impacts on all those in the classroom including the teacher.

The social, academic, physical, and emotional challenges specific to middle school learners are just the tip of the iceberg for middle school teachers. We haven't begun to mention additional obstacles that present themselves in classrooms of all levels, such as unruly behavior, self-centeredness, dysfunctional family situations that affect individual students and those around them, copious assessments, movement to other classes, and various interruptions from P.A. announcements and phone calls to bomb threats and other safety-related concerns. Building an effective learning community is definitely an emotionally laden task that can be tricky.

Yet another significant element of the middle school learning environment that we tend to overlook is the physical space and layout of the classroom. Although elementary teachers consider organization and placement of materials and desks and special classroom areas for interest centers, free reading, or group meetings, the traditional middle school classroom can be an uninviting place. Many of the middle school classrooms we've visited have desks with immovable chairs (the desk and the chair are joined together with the desktop's surface on the right-hand side) that are aligned in rows. If left-handed students are fortunate, they might find one desk that has a writing surface on the left-hand side. In order to accommodate group work, students must move their entire desk (as opposed to just a chair). The desks are usually made of hard wood and metal, and the chairs are not adjustable or comfortable for growing teens. Our students are forced to hunch over, slump, and stretch out their legs almost to the point that they're lying back in their chairs, just to try to get more comfortable. While we can't modify the basic physical layout of the classroom, we can make minor improvements to create an appealing environment. Pleasing physical surroundings translate into an increased comfort level for our students, and an upbeat learning atmosphere is well worth the effort. Music and images that appeal to and reflect students' interests and concerns (celebrities, current movies, sports, etc.)

make your classroom an inviting place. Students who feel at home in their classrooms typically work with more confidence and success.

Finally, if we spend quality time educating our students about emotional intelligence and affect, we equip them with better defenses to handle the stress associated with the transitions to middle school and adolescence. Proponents of SEL claim that such training

also improves focus and recall in the classroom, along with a multitude of other benefits mentioned earlier in this chapter. Moreover, attention to affect via SEL helps students to develop coping mechanisms to deal with family and other personal issues that trap them emotionally and cognitively (Richardson, 2002). The “appropriate” social and emotional responses that we teach them are those that they will need for success in their future professions, too.

A must-see for students, teachers, and parents is PBS’ *It’s My Life* site (<http://pbskids.org/itsmylife/>). It offers videos, games, journal activities, interviews with teen celebrities, and offline activities in the following areas: friends, family, school, body, emotions, and money. When you click on the “School” icon, there is a drop-down menu that says “More topics” further down the screen, just above the “Games” section. Choose “Middle School.”

Celebrate your students! There’s a fun read at **Fifty Great Things About Middle Schoolers!** (www.education-world.com/a_curr/curr097.shtml).

Check out the numerous resources at the **Collaborative for Academic, Social and Emotional Learning** (www.casel.org/home.php). It has a wealth of information about SEL, particularly a long list of programs used by schools across the nation.

Summary

As you invest yourself in the “tweens” in your classrooms—those with developing, ungainly adult bodies and still malleable children’s hearts—we encourage you to assimilate DI strategies and technology. Differentiated instruction powered by technology assists us in our endeavor to meet the physical, intellectual, and emotional challenges and needs specific to middle school learners that we have examined throughout this chapter. As a differentiator, technology helps us to personalize

learning for our extremely varied students through collaborative learning and problem solving, which are excellent activities for the growing brain and for our students’ future professions in the world of work. Technology facilitates modification of instruction in several areas to meet the needs of diverse students by making changes to subject matter (content), channels of throughput (process), means of output (product), and the learning environment. As a great motivator, technology has a powerful influence on our students’ affect levels.

In Chapter 3, we’re going to explore some of the tech tools and strategies available to us through the read/write web also known as Web 2.0. We’ll identify its nine technologies that have the most impact on teaching and learning and investigate how you might use them in your classroom.

Grace E. Smith received a PhD in instructional (educational) technology from Wayne State University. Her experience includes 10 years as a teacher and reading specialist in public and private schools and 11 years as a technology curriculum coordinator and trainer for a school district of 10,000 students. She has also worked as the director of continuing professional education at a business college, as an educational consultant, as a curriculum coordinator and course developer for a Fortune 500 company, and as an adjunct professor at two universities, where she taught writing and technology courses.

Stephanie Throne received a PhD in Romance Languages and Literatures: Spanish from the University of Michigan at Ann Arbor. She has extensive experience in developing online educational materials and was the first instructor at her institution to offer online foreign language classes. She currently works as an author consultant and presents at many conferences, workshops, and webinars. In addition, Throne teaches Spanish, math, reading, and writing for various instructional and private organizations. Throne is the co-author of a forthcoming Spanish text and is an editor and proofreader for several publications.

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