Hand-in-Hand: Differentiated Instruction & the Brain

Western Carolina University
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Differentiation

is a teacher's response to learners' needs

Guided by mindset and general principles of differentiation

Respectful tasks  Quality curriculum  Teaching up  Flexible grouping  Continual assessment  Building community

Teachers can differentiate through

Content  Process  Product  Affect  Learning environment

According to students'

Readiness  Interest  Learning profile

Using instructional strategies such as:

RAFTS, Graphic Organizers, Scaffolded Reading, Cubing, Think-Tac-Toe, Learning Contracts, Tiering, Learning/Interest Centers, Independent Studies, Intelligence Preferences, Orbitals, Complex Instruction, 4MAT, Web Quests & Web Inquiry, ETC.
The Brain and Learning
Not surprisingly, the brain devotes much of its resources to ensuring our survival. Our brain is always tracking our feelings, environmental feelings, and our sense of touch. Each second, some 30 million bits of information are processed non-consciously in our tactile sensory areas. As humans, we are exquisitely designed to be sensitive to our environment. Therefore, there can be a huge difference in the classroom by realizing the importance of the physical and emotional climate with careful planning and a heightened awareness of the importance of student comfort and safety.

Without a doubt, threat is the number one block to learning (Jensen 2000). One of the main problems with threat is that it triggers the amygdala (the brain’s fear and emotional response center) to release an overabundance of cortisol in the brain. In moderate amounts, cortisol is not harmful. When produced in excess, for long periods of time, however, cortisol becomes so toxic that it damages brain cells by the billions. Cortisol damages brain cells by inhibiting their intake of glucose, the primary source of fuel that provides the brain with the energy it requires to perform all its functions. The hippocampus, the semantic memory manager, is the primary target. Starved of fuel, brain cells atrophy and eventually die.

**Threat** is different from challenge. While challenge, in the form of complex and difficult tasks, often produces some forms of threat, it rarely subjects the brain to prolonged high levels of cortisol. For learners, feeling threatened usually relates to consistently poor treatment by others or to unrealistic expectations and the possibility of sanctions that tend to accompany failure.

**IMPORTANT:** It is given that the learning environment needs to be such that the students feel safe from any physical danger. However, that’s not enough. In addition, the students must feel safe from fear of significant embarrassment.

**Can your students answer the following questions as absolutely true?**

- I don’t worry about feeling stupid or incapable in this class.
- Nothing about my friends, my family, or myself will be divulged that I might find embarrassing.
- I’m not labeled or judged in front of others.
- I know I won’t be harmed or hurt in any way.
Checklist: Safety and Motivation in the Classroom
(adapted from: Motivation and Learning, Rogers, Ludington, and Graham, 1999)

The following statements were adapted from an inventory used during NC Teacher Academy training with Spence Rogers, director of PEAK Learning. It is actually an inventory of feelings and thoughts students might use to rate the safety and motivational standards of their class. Rate the accuracy of safety and motivation in your classroom based on the following scale:

(4) Yes! This is absolutely true.
(3) This is really close.
(2) This isn’t quite right.
(1) This is some hint of this.
(0) This is absolutely not accurate.

I feel safe because…

____ I don’t worry about feeling stupid or incapable in this class.
____ Nothing about my friends, family, or myself will be divulged that I may find embarrassing.
____ I am not labeled or judged in front of others.
____ What happens in this class is not displayed or used elsewhere to control my behavior or me.
____ I know I won’t be hurt or harmed in any way.

I value and feel successful about what we’re learning because…

____ I believe what I am learning is worthwhile and will help me later.
____ It’s fun and/or interesting to me.
____ What I am learning and what I am doing is challenging.
____ I know my teacher has confidence in my abilities.
____ I am expected to achieve at the highest levels, and I am supported until I do.
____ I get regular evidence of my progress or mastery.

I feel involved because …

____ I get to make choices and decisions.
____ I have many opportunities to engage and respond.
____ I am encouraged to be innovative and creative.
____ I am meaningfully included in establishing goals, procedures, and standards.
____ I draw on knowledge and resources from outside school.

I think this is a caring place to be because…

____ I feel valued.
____ I enjoy being here – it feels good, people care about my needs and me.
____ People listen sincerely and supportively to my ideas.
____ I feel like I am part of the group.
____ Praise and recognition are sincere, adequate, and done in ways that are comfortable to me.

It is easy for me to learn because…

____ The instructional practices match my learning style, are effective, and are varied in interesting.
____ I have a clear understanding of what is expected of me.
____ I can see what I am learning fits into what I already know.
____ I get the help and resources I need to be successful.
____ I receive adequate, specific, and non-judgmental feedback that is helpful and inspiring.
Emotion and Learning
Things become real to the brain when we feel them.

I. The Physiology and Nature of Emotions
- Emotion drives attention. Attention is a precursor for learning and memory.
- Things become real to the brain when we feel them.
- Emotions are at least two times as fast as rationale thought.
- Practice and emotion are the two things that cause changes to take place in the brain when we learn.
- It is biologically impossible to learn something to which the brain has not paid attention.
- Emotions are now known to be a primary catalyst in the learning process.

II. The Roles of Emotion in Learning
Emotion
- directs attention.
- creates meaning.
- motivates us.
- influences our priorities and goals.
- helps us focus our reason and logic.
- drives our creativity.
- affects our memory.
- affects alertness.
- speeds up thinking and decision-making.
- affects problem-solving ability.
- influences behavior.
- is crucial to survival.
- constitutes our personalities.

III. Eliciting Positive Emotions and Boosting the Emotional Content of What You’re Teaching
- Use material that has a high emotional content.
- Discuss people’s and literary characters’ motivations.
- Set realistic, but high, expectations.
- Smile; incorporate humor, pleasure, and celebrations.
- Offer personal attention, acts of caring, and recognition.
- Involve students in cooperative learning activities; foster friendships.
- Create an atmosphere of safety, security, and belonging.
- Use music.
- Give students opportunities to stretch and move.
- Use games, friendly competition, and other enjoyable activities.
- Incorporate storytelling, myths, legends, parables, and metaphors.
- Try role-playing, skits, and debates.
- Introduce novelty and high contrast.
- Incorporate suspense, cliffhangers, and things left open-ended and unresolved.
- Create positive stress.
- Structure appropriate challenges and problems to solve.
- Give students the locus of control; whenever possible, offer them a choice.
• Point out to students the relevance of what they are learning.
• Have them practice in real-life situations and contexts.
• Provide instruction via multiple pathways.
• Include rubrics for self-assessment, such as computer-assisted instruction, that provide non-punitive feedback.
• Avoid sarcasm and put-downs, threats and humiliation, unrealistic deadlines, compelling rewards, unfair demands, competition that’s not friendly and good-natured, withdrawal of attention, disruptive student behavior that stresses other students.

IV. The Teacher’s Emotional State
• Teachers are every bit as emotional beings as students are.
• Your emotional state will either enhance or hurt what happens in class each time.
• Your attitude and state of mind are as important as the material you present.
• Center yourself before you go to class.
• Teachers who smile, have a sense of humor, a joyful attitude, and take genuine pleasure in their work generally have higher performing students.
• Plan carefully for class.
• Take care of yourself physically, mentally, and emotionally.
• If the learner is confident, learning increases.
• If the learner believes in the teacher, learning increases.
• If the learner thinks the subject is important and valuable, learning increases.
• If the learner believes it will be fun, learning increases.
• *All of these involve emotion, and as the teacher, you have enormous control over them.* This is what it means to win students’ hearts and minds. It’s our task to do both.

• Did you know that …we use 42 facial muscles to express emotions; there are about 10,000 human facial expressions; and more than 600 words in English are used to describe emotions?

“*Emotion is a primary catalyst in the learning process.*”
Pat Wolfe, Ed.D., educator, consultant, & author

Quick Tips to Increase Emotional Safety, Motivation, and Learning
(sources include Jensen, Rogers, Wolfe, and Sousa)

1. **Feed the brain:** The brain needs food and oxygen that is provided primarily through blood pumped straight to the brain. Although the brain is only about 2% of the body’s adult weight, it consumes almost 25% of the body’s energy. Movement increases oxygen to the brain.

2. **Keep hydrated:** The brain is approximately 80% water. Students become restless and have scattered attention when they are mildly dehydrated...slow and lethargic when severely dehydrated. Drinking plenty of water improves brain function.

3. **Take time to process:** Receiving constant input is like pouring more water into a cup that is full. It is not as effective as receiving input punctuated by breaks for processing. Reflection time reinforces the neural connections that are created through learning. Give students frequent breaks during reading, videos, lectures, etc. to process what they have learned.

4. **Colors:** Use blue to signify important information. It is the easiest color to see. Use the cool colors (blue, purple, brown, black, green, and brown) when students have to read material at a distance.

5. **Colors:** Avoid using the fire colors (red, orange, yellow) except to highlight, circle, or underline but NEVER TO WRITE. Not only do they tend to raise anxiety, they are hard to read at a distance.

6. **Review:** For every 10 minutes of content, have 2 minutes of application or review.

7. **Mark:** what is correct instead of what is incorrect on student papers...using the cool colors.

8. **Display:** learners’ work below waist level...emotions.

9. **Reduce praise:** from your feedback...rather give encouragement.... “You’re on the right track...”

10. **Schedule:** more global, less specific, detailed activities in the afternoon when the brain’s attention molecules are lower.

11. **At test time:** allow students to move their chairs away from other students...to let their eyes wander...eye movements!

12. **Increase feedback:** to learners up to every 15 – 30 minutes to insure understanding and accountability (through peer teaching, mind maps, etc.).

13. **Use the 28-over-3 rule:** rather that testing at the end of the unit, expose students to the concepts at least 28 times over the next 3 weeks through extra practice and/or extension of concept.

14. **Have students stand:** or move at least the major muscles every 20 – 30 minutes....trying for every 10 – 12 minutes.

15. **Post a High-Five hand:** at the door…and have students give themselves a high-5 for what they’ve learned at the end of class.

16. **10-2 Rule:** Brain research confirms that a student’s attention span is about one minute for every year of age. Take the average age of your students. That number, plus or minus two, is the appropriate number of minutes you can expect them to focus. Age +/- 2 = minutes of focus.