



EXPEDITIONARY  
LEARNING

## **Grade 7: Module 4A: Unit 1: Lesson 8**

**Close Reading:** Excerpt 5 of “The Digital Revolution and the Adolescent Brain Evolution”



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**Long-Term Targets Addressed (Based on NYSP12 ELA CCLS)**

I can cite several pieces of text-based evidence to support an analysis of informational text. (RI.7.1)

I can read above-grade-level texts with scaffolding and support. (RI.7.10)

I can use a variety of strategies to determine the meaning of unknown words or phrases. (L.7.4)

**Supporting Learning Targets**

- I can determine the main idea in Excerpt 5 of “The Digital Revolution and the Adolescent Brain Evolution.”
- I can use a variety of strategies to figure out the meaning of new vocabulary.
- I can read above-grade-level texts with support.

**Ongoing Assessment**

- Homework: Excerpt 4 of “The Digital Revolution and the Adolescent Brain Evolution”
- Excerpt 4 text-dependent questions
- Thinking Logs



| Agenda  | Teaching Notes   |
|---|--|
| <ol style="list-style-type: none"> <li>1. Opening               <ol style="list-style-type: none"> <li>A. Entry Task: Defining Vocabulary Words from Unit 1 (2 minutes)</li> <li>B. Sharing Unit I Vocabulary (6 minutes)</li> <li>C. Reviewing Learning Targets (2 minutes)</li> </ol> </li> <li>2. Work Time               <ol style="list-style-type: none"> <li>A. Analyzing the Main Idea (7 Minutes)</li> <li>B. Excerpt 5: Text-Dependent Questions (18 minutes)</li> </ol> </li> <li>3. Closing and Assessment               <ol style="list-style-type: none"> <li>A. Thinking Logs (4 minutes)</li> <li>B. Adding to the Brain Development Anchor Chart (6 minutes)</li> </ol> </li> <li>4. Homework               <ol style="list-style-type: none"> <li>A. Continue reading your independent reading book.</li> </ol> </li> </ol> | <ul style="list-style-type: none"> <li>• In this lesson, students continue to read excerpts from “The Digital Revolution and the Adolescent Brain Evolution.” See Teaching Notes from Lesson 5 for more on this text. As this is their third encounter with the text-dependent question activity, students will work more independently today.</li> <li>• This excerpt centers on social interaction in the digital world. Today’s learning is central to understanding the model essay in Unit 3.</li> <li>• As in Lesson 7, students will add “if/then” statements to their Brain Development anchor chart. Being able to practice making inferences from science will scaffold them toward creating their position paper in Unit 3. Remind students to use words and phrases like “may” and “it seems reasonable” to mirror the cautionary tone of scientists.</li> <li>• Collect but do not grade Homework: Excerpt 4 of “The Digital Revolution and the Adolescent Brain Evolution.” Rather, use it as formative assessment. Students will need it again in Lesson 9.</li> <li>• In advance:               <ul style="list-style-type: none"> <li>– Load the multimedia feature from the <i>New York Times</i> Web site:<br/><a href="http://www.nytimes.com/interactive/2010/11/21/technology/20101121-brain-interactive.html?ref=technology">http://www.nytimes.com/interactive/2010/11/21/technology/20101121-brain-interactive.html?ref=technology</a>.</li> <li>– Prepare Quiz-Quiz-Trade cards (see supporting materials) and review the Quiz-Quiz-Trade protocol.</li> <li>– Decide how best to group students into triads for Work Time B.</li> <li>– Consider posting the Domain-Specific Vocabulary anchor chart.</li> </ul> </li> <li>• Post: Learning targets.</li> </ul> |



| Lesson Vocabulary        | Materials   |
|--------------------------|---|
| <p>No new vocabulary</p> | <ul style="list-style-type: none"> <li>• Unit 1 Vocabulary Quiz-Quiz-Trade cards (one card per student)</li> <li>• Domain-Specific Vocabulary anchor chart (optional; begun in Lesson 2)</li> <li>• Analyzing the Main Ideas: Sam Crocker (one per student)</li> <li>• “Students and Technology: Constant Companions” (multimedia feature; <a href="http://www.nytimes.com/interactive/2010/11/21/technology/20101121-brain-interactive.html?ref=technology">http://www.nytimes.com/interactive/2010/11/21/technology/20101121-brain-interactive.html?ref=technology</a>)<br/>(From The New York Times, November 20, 2010 © 2010 The New York Times. All rights reserved. Used by permission and protected by the Copyright Laws of the United States. The printing, copying, redistribution, or retransmission of this Content without express written permission is prohibited.)</li> <li>• Digital projector</li> <li>• Analyzing the Main Ideas: Sam Crocker (answers, for teacher reference)</li> <li>• Excerpt 5 of “The Digital Revolution and the Adolescent Brain Evolution” (one per student)</li> <li>• Excerpt 5 of “The Digital Revolution and the Adolescent Brain Evolution” text-dependent questions (one per student; one to display)</li> <li>• Excerpt 5 of “The Digital Revolution and the Adolescent Brain Evolution” Close Reading Guide (for teacher reference)</li> <li>• Document camera</li> <li>• Thinking Logs (begun in Lesson 2)</li> <li>• Model Brain Development anchor chart (for teacher reference)</li> <li>• Brain Development anchor chart—student version (begun in Lesson 2)</li> <li>• Brain Development anchor chart (begun in Lesson 2)</li> <li>• Note cards or sticky notes (two per student pairs)</li> </ul> |



| Opening   | Meeting Students’ Needs  |
|---|--|
| <p><b>A. Entry Task: Defining Vocabulary Words from Unit 1 (2 minutes)</b></p> <ul style="list-style-type: none"> <li>• Distribute one vocabulary card for each student from the <b>Unit 1 Vocabulary Quiz-Quiz-Trade cards</b>.</li> <li>• Ask students to write the definition of the word on the back of the card. Remind them that they can use their prior neurologist notebook entries or any of their readings to define the word. If you have posted the Domain-Specific Vocabulary anchor chart, you may suggest the students use it. Consider covering it at this time but letting the students reference it after step 6 to check themselves.</li> </ul>   | <ul style="list-style-type: none"> <li>• If students need help defining the word, prompt them to look at their neurologist notebooks, Domain-Specific Vocabulary anchor chart, or other classroom resources.</li> <li>• Consider allowing students to choose from multiple representations (words, pictures, etc.) on the back of the Quiz-Quiz-Trade card to help define the word.</li> <li>• Checking in with learning targets helps students self-assess their learning. This research-based strategy supports struggling learners most.</li> </ul> |
| <p><b>B. Sharing Unit 1 Vocabulary (6 minutes)</b></p> <ul style="list-style-type: none"> <li>• Let students know that they will be doing the Quiz-Quiz-Trade protocol. Briefly review the directions:             <ol style="list-style-type: none"> <li>1. When prompted, find a partner and show him or her the vocabulary word on your card.</li> <li>2. Your partner will use his or her resources to try to define your word.</li> <li>3. Then the process repeats, with you defining your partner’s word.</li> <li>4. After both of you have tried to determine the meaning of the words, share the correct definitions, then trade cards and find new partners.</li> <li>5. Clarify directions as needed, and then invite the class to begin. Circulate to guide students and to listen in on their understanding of the words.</li> <li>6. Once students have partnered up four times, ask them to return to their seats.</li> </ol> </li> </ul> | <ul style="list-style-type: none"> <li>• Allowing students to discuss with a partner before writing or sharing with the whole class is a low-stress strategy to help them process in a risk-free situation.</li> </ul>   |



| Opening (continued)  | Meeting Students’ Needs |
|--|-------------------------|
| <p><b>C. Reviewing Learning Targets (2 minutes)</b></p> <ul style="list-style-type: none"> <li>• Read the day’s learning targets aloud or ask a volunteer to do so.</li> <li>• Remind students of the Fist to Five technique (introduced in Module 1).</li> <li>• Cold call a few students to provide evidence for the rating they gave themselves.</li> </ul> <p>Tell students that today they will review the homework in preparation for their end of unit assessment (in Lesson 10), during which they will need to identify and evaluate arguments.</p> |                         |

| Work Time   | Meeting Students’ Needs |
|---|-------------------------|
| <p><b>A. Analyzing the Main Idea (7 minutes)</b></p> <ul style="list-style-type: none"> <li>• Distribute <b>Analyzing the Main Ideas: Sam Crocker</b>.</li> <li>• Direct the students’ attention to the multimedia feature “<b>Students and Technology: Constant Companions</b>” cued up on the <b>digital projector</b>.</li> <li>• Play the audio under “The Illusion of Social Interaction: Sam Crocker.” The audio is 1:18. Repeat the audio at least two more times.</li> <li>• Give students a minute to write down their thoughts. Then cold call on students. Use <b>Analyzing the Main Ideas: Sam Crocker (answers, for teacher reference)</b> for suggested responses.</li> </ul> |                         |



| Work Time (continued)   | Meeting Students’ Needs   |
|---|---|
| <p><b>B. Excerpt 5: Text-Dependent Questions (18 minutes)</b></p> <ul style="list-style-type: none"> <li>• Arrange students in pairs.</li> <li>• Distribute <b>Excerpt 5 of “The Digital Revolution and the Adolescent Brain Evolution.”</b> Also distribute <b>Excerpt 5 of “The Digital Revolution and the Adolescent Brain Evolution” Text-Dependent Questions</b> and display a copy on a <b>document camera</b>.</li> <li>• Work through this handout in concert with the <b>Excerpt 5 of “The Digital Revolution and the Adolescent Brain Evolution” Close Reading Guide</b>.</li> <li>• Keep students in pairs for the Closing activities.</li> <li>• Note: Remember to collect Homework: Excerpt 4 of “The Digital Revolution and the Adolescent Brain Evolution.”</li> </ul> | <ul style="list-style-type: none"> <li>• Hearing a complex text read slowly, fluently, and without interruption or explanation promotes comprehension and fluency for students: They are hearing a strong reader read the text aloud with accuracy and expression and are simultaneously looking at and thinking about the words on the printed page. Be sure to set clear expectations that students read along silently in their heads as you read the text aloud.</li> </ul> |

| Closing and Assessment   | Meeting Students’ Needs |
|--|-------------------------|
| <p><b>A. Thinking Logs (4 minutes)</b></p> <ul style="list-style-type: none"> <li>• Ask students to retrieve their <b>Thinking Logs</b> (from Lesson 2) and answer the questions for Lesson 8:             <ul style="list-style-type: none"> <li>– In “Attention Economy,” Dr. Giedd argues that “real-life” activities like traditional homework, talking to friends, and working toward a long-term goal usually don’t provide the same jolt of dopamine of media devices. Why might that be a problem for students?</li> <li>– What else are you wondering about the adolescent brain’s development?</li> </ul> </li> <li>• After a few minutes, ask students to “popcorn” out their answers.</li> </ul> |                         |



| Closing and Assessment (continued)  | Meeting Students’ Needs  |
|---|--|
| <p><b>B. Adding to the Brain Development Anchor Chart (6 minutes)</b></p> <ul style="list-style-type: none"> <li>• Refer to the <b>Model Brain Development anchor chart (for teacher reference)</b> as needed for this section of the lesson.</li> <li>• Remind students that the class has been practicing making “if/then” statements from the reading.</li> <li>• Invite students to retrieve their <b>Brain Development anchor chart—student version</b> and focus their attention on the class <b>Brain Development anchor chart</b>. Add new information to the “prefrontal cortex” column of the anchor chart and ask students to do the same on their own copies:             <ul style="list-style-type: none"> <li>– “The PFC is central hub of social circuitry. (Giedd)”</li> </ul> </li> <li>• Ask students to turn and talk with their partner:             <ul style="list-style-type: none"> <li>* “What ‘if/then’ statement can you make from the learning about the social brain today?”</li> </ul> </li> <li>• After a minute, ask students to share out. Circle the statement you just wrote and draw a line to the “So what?” column. Write something like:             <ul style="list-style-type: none"> <li>– “<u>If</u> the PFC is the social hub and it is still developing in teens, <u>then</u> teens may still need practice with social skills.”</li> <li>– “<u>If</u> there are non-verbal social cues that can only be learned in the physical presence of a person, <u>then</u> if someone is mostly socializing online he or she may not learn those skills.”</li> </ul> </li> <li>• Distribute <b>note cards</b> (or sticky notes if the class anchor chart is posted on the wall).</li> <li>• Ask students to make at least two more “if/then” statements with their partner. They can use their learning from today or from any other reading.</li> <li>• Look for students to write things like:             <ul style="list-style-type: none"> <li>– <u>If</u> you’re extra sensitive to dopamine, <u>then</u> you may crave activities that activate dopamine more.</li> <li>– <u>If</u> you are synaptic pruning based on your behavior, <u>then</u> your behavior may be shaping your brain.</li> <li>– <u>If</u> your prefrontal cortex isn’t fully available, <u>then</u> you should ask for help when you make decisions.</li> </ul> </li> <li>• Students may place their sticky notes on the anchor chart as they leave (if it’s on chart paper) or hand in their note cards. Be sure they write their names on them. Transfer the students’ ideas to the class anchor chart either during or after class.</li> </ul> | <ul style="list-style-type: none"> <li>• Consider supporting your struggling students by providing half of the If/Then statement. You may prompt them with:</li> <li>• If you’re extra sensitive to dopamine then...</li> <li>• If there are non-verbal social cues that can only be learned in the physical presence of a person then if you are mostly socializing online....</li> </ul> |



| Homework  | Meeting Students’ Needs |
|---|-------------------------|
| <ul style="list-style-type: none"><li>• Continue reading your independent reading book.</li></ul> |                         |



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# Grade 7: Module 4A: Unit 1: Lesson 8

## Supporting Materials



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Vocabulary Quiz-Quiz-Trade Cards

|                                 |                                    |
|---------------------------------|------------------------------------|
| <b>neurological development</b> | <b>electrochemical<br/>impulse</b> |
| <b>neurons</b>                  | <b>neurotransmitter</b>            |
| <b>prefrontal cortex</b>        |                                    |



Vocabulary Quiz-Quiz-Trade Cards

|                       |                         |
|-----------------------|-------------------------|
| <b>limbic system</b>  | <b>dendrites</b>        |
| <b>neural impulse</b> | <b>synapse</b>          |
| <b>axons</b>          | <b>myelination</b>      |
| <b>myelin</b>         | <b>synaptic pruning</b> |



Vocabulary Quiz-Quiz-Trade Cards

|                       |                          |
|-----------------------|--------------------------|
| <b>brain pathways</b> | <b>dopamine</b>          |
| <b>plastic</b>        | <b>brain plasticity</b>  |
| <b>adaptable</b>      | <b>social cognition</b>  |
| <b>gray matter</b>    | <b>neural insulation</b> |



Vocabulary Quiz-Quiz-Trade Cards

**neuroscientists**

**complementary**

**socioeconomic**

**adaptive mechanisms**



Analyzing the Main Ideas: Sam Crocker

Name:

Date:

**Directions:** The audio selection you will listen to today has two main ideas. As you listen, write down at least two supporting details for each main idea. You will hear it three times.

|  |   |
|--|---|
| <p><b>Main idea:</b><br/>My attention span has gotten worse.</p> | <p><b>Main idea:</b><br/>The social interactions on Facebook are an illusion.</p> |
| <p><b>Supporting details:</b></p>                                | <p><b>Supporting details:</b></p>   |

Which main idea best relates to the reading you did last night? Why?

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Analyzing the Main Ideas: Sam Crocker  
(Answers, For Teacher Reference)

**Directions:** The audio selection you will listen to today has two main ideas. As you listen, write down at least two supporting details for each main idea. You will hear it three times.

|   |  |
|---|--|
| <p>Main idea:<br/>My attention span has gotten worse.</p>   | <p>Main idea:<br/>The social interactions are an illusion.</p>   |
| <p><b>It's harder for me to do nothing.<br/>I want to fill empty time.<br/>It's hard to focus on one stream of information.</b></p> | <p><b>Reading about other people's lives is not real interaction.<br/>I learn things about people that I don't care about.<br/>I feel like I need to be in touch with the outside world, but it's an illusion.</b></p> |

Which main idea best relates to the reading you did last night? Why?

**The main idea that best relates is the fact that Sam's attention span has gotten worse. He says he can't sit and do nothing. He also cannot focus on one thing at a time. It's as if doing nothing or doing one thing doesn't provide enough stimulation for him. In the reading last night, Dr. Giedd asked if someone's brain might get used to a certain level of dopamine and immediate reinforcement. It seems that Sam's is used to the artificially high levels of dopamine from constant stimulation, so he feels restless if he doesn't have that stimulation.**



Excerpt 5 of “The Digital Revolution and the Adolescent Brain Evolution”

Name: \_\_\_\_\_

Date: \_\_\_\_\_

| From “Digital Revolution—Social”  | Gist Notes and Vocabulary  |
|---|--|
| <p>(1) The human brain is a social brain. Our ability to <b>gauge</b> the moods and intentions of others, to detect the truth or falsehood of their communications, to <b>discern</b> friend from foe, and to form alliances are among its most complex and important tasks. These skills are of premier importance to fulfill our <b>biological imperatives</b> of staying alive (through the protection of the group) and reproducing. From this perspective, it is no wonder that so much of our brains is dedicated to <b>social cognition</b> ...</p>  | <p>Gauge=<br/>Discern=<br/>Biological imperative= the thing we must do to live<br/>Social cognition=</p>   |
| <p>(2) The central hub of circuitry related to social skills is the late-maturing highly plastic prefrontal cortex. Like any complex skills, <b>mastery</b> requires lots of practice. Much of the discernment relies on exquisitely subtle detection of non-verbal cues such as slight changes in eye gaze, millisecond differences in speech timing, <b>synchrony</b> of response to shared environmental <b>stimuli</b>, breathing patterns, body posture, touch, odors, etc. Might the increasing reliance on digital social interactions <b>hinder</b> exposure to the “real-world” experiences necessary to master these most important skills?</p> | <p>Mastery=if you have mastery in something, you are really good at it.<br/>Synchrony=occurring at the same time<br/>Stimuli=<br/>Hinder=stop or limit</p> |

Geidd, Jay N., M.D. "The Digital Revolution and Adolescent Brain Evolution." National Center for Biotechnology Information. National Institute of Health, 5 Aug. 2012. Web. <<http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3432415/>>



Excerpt 5 of “The Digital Revolution and the Adolescent Brain Evolution”:  
Text Dependent Questions

| Questions  | Notes |
|--|-------|
| <p>1. Dr. Giedd states, “The human brain is a social brain.” He then goes on to describe four important social tasks that a person’s brain must be able to do. Describe those four tasks in your own words.</p> <p>2. Dr. Giedd describes the prefrontal cortex as the “late-maturing highly plastic prefrontal cortex.” What does this statement tell us about the prefrontal cortex?</p> <p>3. Referring to the social skills that a human being needs, Dr. Giedd says, “Like any complex skills, mastery requires lots of practice.” How might someone practice social skills?</p> <p>4. What is a <i>non-verbal</i> cue?</p> <p>5. What is one of the non-verbal cues Dr. Giedd lists?</p> |       |



Excerpt 5 of “The Digital Revolution and the Adolescent Brain Evolution”:  
Text Dependent Questions

| Questions   | Notes |
|---|-------|
| <p>6. Dr. Giedd describes the non-verbal cues as “exquisitely subtle.” Which of these phrases does NOT reinforce that idea:</p> <p>“slight changes,” “millisecond differences,” or “breathing patterns”</p> <p>7. Why might these be hard to practice if you are socializing digitally?</p> <p>8. Paraphrase this question in your own words:</p> <p>“Might the increasing reliance on digital social interactions <b>hinder</b> exposure to the ‘real-world’ experiences necessary to master these most important skills?”</p> |       |



Excerpt 5 of “The Digital Revolution and the Adolescent Brain Evolution”:  
Close Reading Guide  
(For Teacher Reference)

**Total Time:** 18 minutes

| Questions  | Close Reading Guide  |
|--|--|
| <p>1. Dr. Giedd states, “The human brain is a social brain.” He then goes on to describe four important social tasks that a person’s brain must be able to do. Describe those four tasks in your own words.</p> <p>2. Dr. Giedd describes the prefrontal cortex as the “late-maturing highly plastic prefrontal cortex.” What does this statement tell us about the prefrontal cortex?</p> | <p>(8 minutes)</p> <p>Read the excerpt once.</p> <p>Pause to clarify the vocabulary. You may wish to prompt the students with these vocabulary questions:<br/><i>What is a gas gauge? What does it do?</i><br/><i>The Latin root “cogn-” means to know. How does that help you?</i><br/><i>The prefix “dis-” means apart from. How does that help you? (Point out “discernment” in the next paragraph.)</i></p> <p>Read the first question. Then reread the first paragraph. Make sure you pause at the comma after each social task. To further assist students, you may want to hold up fingers to indicate the first, second, etc.</p> <p>Give students a moment to answer the question on their own and then ask them to turn and talk with their partner.</p> <p>Ask partners to raise their hands when they can identify the four tasks of Question 1.</p> <p>When most hands are raised, call on students. Listen for them to say: <i>to tell how others are feeling, to tell who is a friend and who is an enemy, to tell if someone is lying, and to make friends.</i></p> <p>Reread the second paragraph.</p> <p>For the next 10 minutes, students will work in pairs on Questions 2–8. Because this is the third close reading the students have completed, in this lesson you will give them a chance to answer with a partner instead of whole class.</p> |



Excerpt 5 of “The Digital Revolution and the Adolescent Brain Evolution”:  
Close Reading Guide  
(For Teacher Reference)

| Questions   | Close Reading Guide   |
|---|---|
| <p>3. Referring to the social skills that a human being needs, Dr. Giedd says, “Like any complex skills, mastery requires lots of practice.”</p> <p>Rephrase that sentence.</p> <p>How might someone practice social skills?</p>  | <p>You may consider working with a group of struggling students or circulating to provide assistance.</p> <p>Listen for students to something like:</p> <p>2. <i>The PFC matures late and is very changeable.</i></p> <p>3. <i>“Like any hard skill, in order to become very good at it, one needs to do it over and over again.” Someone practices social skills by being around and trying to relate to people.</i></p> |
| <p>4. What is a <i>non-verbal</i> cue?</p> <p>5. What is one of the non-verbal cues Dr. Giedd lists?</p> <p>6. Dr. Giedd describes the non-verbal cues as “exquisitely subtle.” Which of these words does NOT reinforce that idea:</p> <p>“slight changes, “millisecond differences,” or “breathing patterns”</p> <p>7. Why might these be hard to practice if you are socializing digitally?</p> | <p>4. <i>A non-verbal cue is something that is not said in words, i.e., body language.</i></p> <p>5. <i>Changes in breathing patterns, body postures, eye gaze, etc.</i></p> <p>6. <i>“Breathing patterns” does not reinforce the idea of subtle.</i></p> <p>7. <i>Because you need to be physically around someone to practice non-verbal cues.</i></p>  |



Excerpt 5 of “The Digital Revolution and the Adolescent Brain Evolution”:  
Close Reading Guide  
(For Teacher Reference)

| Questions   | Close Reading Guide  |
|---|--|
| <p>8. Paraphrase this question in your own words:</p> <p>“Might the increasing reliance on digital social interactions <b>hinder</b> exposure to the ‘real-world’ experiences necessary to master these most important skills?”</p> | <p><i>8. If we are interacting socially, will we still get enough practice with non-verbal social cues to get good at socializing?</i></p> |



Model Brain Development Anchor Chart  
(For Teacher Reference)

Note: This chart is filled out in different lessons. The bolded items are added in this lesson.

| Other developmental information   | Prefrontal cortex  | Neurons  | Limbic system  | So what?   |
|---|--|--|--|--|
| <p>The brain needs sleep to take things from your short-term memory to your long-term memory (Knox)</p> <p>Your brain does not fully develop until the mid-20s (Scholastic)</p> | <p>Also called the “frontal lobe” (Knox)</p> <p>This area helps with insight and understanding the effect of your behavior on someone else (Knox)</p> <p>Matures later than other parts of the brain (Scholastic)</p> <p>Right behind your forehead (Scholastic)</p> <p>Helps with thinking ahead and sizing up risk and reward (Scholastic)</p> | <p>“White matter” is called myelin, and it coats the nerves and makes them “communicate” more effectively (Knox)</p> <p>In order for your brain to make a decision, tiny specialized cells “talk” with each other through a series of neurotransmitters, like a circuit in a computer. Then the whole network puts out a response, which becomes your outward behavior. (Scholastic)</p> | <p>Develops earlier than the PFC (Scholastic)</p> <p>Plays a central role in your emotional response (Scholastic)</p> <p>Associated with decisions made in feeling (Scholastic)</p> <p>When teens make decisions in emotionally charged situations—this one weighs in heavily (Scholastic)</p> | <p>So <b>if</b> the PFC is not as efficient, <b>then</b> teens may make decisions without fully realizing long-term consequences. <b>If</b> they do that, <b>then</b> this can be good (they take daring risks) and bad (they take dangerous risks).</p> |



Model Brain Development Anchor Chart  
(For Teacher Reference)

| Other developmental information | Prefrontal cortex  | Neurons  | Limbic system   | So what?   |
|---------------------------------|--|--|---|--|
|                                 | <p><b>The PFC is the central hub of social circuitry (Giedd)</b></p> | <p>Information travels from neuron to neuron by way of their axons and dendrites (Scholastic)</p> <p>The space between one neuron’s axon and the other neuron’s dendrites is called its synapse (Scholastic)</p> <p>To make the connection better, the axons wrap themselves in myelin through a process called myelination (Scholastic)</p> | <p>The limbic system in the teen brain is more sensitive to risk and reward and gets a bigger shot of dopamine in rewarding situations. So it is more biased toward seeking out new information. (Galván)</p> <p>Dopamine is the main neurotransmitter in the limbic system (Giedd)</p> | <p><b><u>If the PFC is the social hub and it is still developing in teens, then teens may still need practice with social skills.</u></b></p> <p><b><u>If there are non-verbal social cues that can only be learned in the physical presence of a person, then if someone is mostly socializing online he or she may not learn those skills.</u></b></p> |



Model Brain Development Anchor Chart  
(For Teacher Reference)

| Other developmental information | Prefrontal cortex | Neurons   | Limbic system   | So what?   |
|---------------------------------|-------------------|---|---|--|
|                                 |                   | <p>Also, if a synapse isn't used often, it is pruned through synaptic pruning. Then that energy is redirected into more active synapse. (Scholastic)</p> <p>Synaptic pruning occurs based on the choices, the behavior, and the environment of an individual (Scholastic)</p> | <p>The limbic system is activated during basic biological drives, by substance abuse, and addictive behaviors. It is also activated by video games. Giedd</p> | <p><u>If</u> video games activate dopamine in the brain similarly to addictive behaviors, <u>then</u> a person may become addicted to video games in the same way someone can be addicted to behaviors.</p> <p><u>If</u> the brain is branching and pruning in adolescence, <u>then</u> it is highly adaptable. (Giedd)</p> <p><u>If</u> it adapted in the past, <u>then</u> it may adapt today. <u>If</u> it is adaptable, <u>then</u> it may be able to adapt the digital world.</p> |



Model Brain Development Anchor Chart  
(For Teacher Reference)

| Other developmental information | Prefrontal cortex | Neurons | Limbic system | So what?   |
|---------------------------------|-------------------|---------|---------------|--|
|                                 |                   |         |               | <p>So <u>if</u> synapses are being pruned or strengthened by the activities that teens spend their time on, <u>then</u> teens can shape their brain. And <u>if</u> activities shape one's brain, <u>then</u> one should be mindful about the activities that one is doing. As Dr. Willis says, "Practice makes permanent."</p> |