UNIT A: LESSON 4

LEARNING TARGETS

INSTRUCTIONS FOR STUDENTS:
Listen as your teacher reviews the standards and objectives. Your teacher will call on an individual or pair to explain what they mean.

Learning Target:
I can **determine** the **main** ideas and **supporting details** in the **article** “The Digital Revolution and Adolescent Brain Evolution.”

Learning Target:
I can **analyze** the **basic structure** of a **complex** sentence.

ACQUIRING AND USING VOCABULARY

INSTRUCTIONS FOR STUDENTS:
Your teacher will pre-teach several key words. Use your glossary for the rest of the lesson to find meanings for words you don’t know. Words that are **bolded** in the text and word banks can be found in the glossary. The glossary is located in the Appendix at the end of the lesson.
THINKING LOG

INSTRUCTIONS FOR STUDENTS:
Your teacher will ask you a guiding question that you will think about as your teacher reads the text aloud to you. As your teacher reads the text aloud, listen and follow along in your text. After the text has been read aloud, work with a partner to reread the text and answer the supplementary questions. Use your glossary to help you. Your teacher will review the answers with the class. You will then discuss the guiding question(s) with your teacher and the class. Finally, you will complete a written response to the guiding question(s).

GUIDING QUESTION: In what ways has learning, playing, and interacting changed for adolescents in the last fifteen years? How can we find answers to questions about the implications of these changes?

THE DIGITAL REVOLUTION AND ADOLESCENT BRAIN EVOLUTION

EXCERPT 1: INTRODUCTION
The way adolescents of today learn, play, and interact has changed more in the past 15 years than in the previous 570 since Gutenberg’s popularization of the printing press. The Internet, iPads (Apple, Inc., Cupertino, CA), cell phones, Google (Google, Inc., Mountain View, CA), Twitter (Twitter, Inc., San Francisco, CA), Facebook (Facebook, Inc., Menlo Park, CA), and other modern marvels unleash a virtual gusher of information to the plugged-in teen brain.

In 2010, U.S. adolescents spent an average of 8.5 hours per day interacting with digital devices, up from 6.5 hours in just 2006. Thirty percent of the time they are simultaneously using more than one device, bringing daily total media exposure time to 11.5 hours. These numbers are a moving target and vary by survey, socioeconomic status, ethnicity, and geography, but all indications are that the amount of screen time has been dramatically increasing and is likely to continue to do so as the technology improves and becomes even more widely available. The pace of "penetration" (i.e., the amount of time it takes for a new technology to be used by 50 million people) is unprecedented. For radio, technological penetration took 38 years; for telephone, 20 years; for television (TV), 13 years; for the World Wide Web, 4 years; for Facebook, 3.6 years; for Twitter, 3 years; for iPads, 2 years; and for Google+, 88 days.

The pace and pervasiveness of these changes, that is, the digital revolution, raise several questions relevant to adolescent health—relevance that extends to children,
teens, parents, teachers, and society at large. What are the implications, for good or ill, of the dramatic changes in the way adolescents spend their time?

How can the technology be harnessed to optimize the positive and minimize the negative? Might the unprecedented rate of change itself overwhelm adaptive mechanisms? The digital revolution gives us unique insight into how experience shapes the brain, and, in turn, how these brain changes may change our experience. Consideration of the neurobiology and evolutionary history of the adolescent brain may provide some context to explore these questions.

**WORD BANK:**
- 38 years
- development
- Internet
- survey
- 50 million
- ethnicity
- iPads
- Twitter
- 6.5
- evolution
- negative
- unprecedented
- 88 days
- Facebook
- nervous system
- up
- adaptive mechanisms
- geography
- neurobiology
- vary
- availability
- Google
- positive
- improvements
- screen time
- socioeconomic status

**SUPPLEMENTARY QUESTIONS:**

1. What examples does the author give of the types of “modern marvels” (amazing inventions) of information available to teens today?
The modern marvels include the __________, __________, __________, __________, __________, and __________.

2. From 2006 to 2010, did the average number of hours adolescents spend with digital devices each day increase or decrease? How do you know?
The hours teens spend with digital devices have __________(increased/decreased). The text says that in 2010, adolescents spent an average of 8.5 hours per day using a device. This number is ______from ______hours spent in 2006.

3. What does the author mean by “the numbers are a moving target”?
The author means that numbers about digital media use ________. That means that the numbers change.

4. What factors, or reasons, influence how the numbers vary (change)?
The factors include the type of __________used to gather information, and the __________, __________, and __________(location) of the adolescents.
5. Whatever the numbers are, what point is the author making?
Whatever the numbers, teens’ exposure to a computer, tablet, or cell phone screen is ______________. This is because of ______________ in technology and ______________ of technology.

6. What does the “pace of penetration” mean?
“Pace of penetration” is the amount of time it takes for a new technology to be used by ______________ people.

7. How long did penetration take for the radio? How long did penetration take for Google?
Radio penetration took ____________. Google penetration took ____________.

8. The author asks three questions about rapid, or fast, changes in media exposure. What questions does he ask?
   A. What are the implications, good or bad, about adolescents spending so much ______________?
   B. How can technology be used for __________ instead of ___________ endeavors?
   C. Can the ______________ rate of change overwhelm ____________________?

9. What does the author believe will help us answer these questions?
The author believes we can understand these questions by considering, or thinking about, ______________ and the ______________ of the adolescent brain.

10. What do “neurobiology” and the “evolution of the adolescent brain” mean?
    Neurobiology is the study of the ______________ including the brain.
    Evolution of the adolescent brain means the ______________ through history of the adolescent ______________.

RESPONSE TO GUIDING QUESTION(S):
In what ways has learning, playing, and interacting changed for adolescents in the last fifteen years? How can we find answers to questions about the implications of these changes?
Response: ______________________________________________________________
______________________________________________________________
______________________________________________________________
______________________________________________________________
______________________________________________________________
______________________________________________________________.
## NEUROLOGIST NOTEBOOK

### INSTRUCTIONS FOR STUDENTS:
Work with a partner. Use your neurologist notebook to write down key, or important, information from the text. You will write down main ideas and some details, or specific information, about each main idea. You can use information from your Thinking Log. Some information is already filled in for you.

### WORD BANK:
6.5, 8.5, 13, 20, 38, adaptive mechanisms, device, experiences, faster, fifty, four, health, implications, neurobiology, penetration, positive, screen time, technology, unprecedented

### Introduction:
Teens are encountering more ___________ at a ___________ pace than ever before.

### Main idea:
Teens’ ___________ is increasing.

#### Supporting details:
In 2006, teens spent _______ hours per day on devices. In 2010 it was up to _______ hours per day. Teens use more than one ________ thirty percent of the time.

### Main idea:
The pace of ___________ is ___________ or faster than ever before.

#### Supporting details:
___________ is the amount of time it takes for ________ million people to use new _________.
Radio penetration took ___ years, telephones _______ years, and television took _____ years. New technology is taking less than _________ years.

### Main idea:
There are many questions about how the digital revolution will affect teen ___________.

#### Supporting details:
What are the ___________ of teens having so much ________? Can we make technology more _________? Can technology overwhelm _____________?

### Conclusion:
The digital revolution is a chance to see how well humans adapt to new _________. We can use the ___________ of the teen brain to help answer our questions.
FUNCTIONAL ANALYSIS

INSTRUCTIONS FOR STUDENTS:
Work with a partner to analyze an important sentence(s) from the text.

- First, you will decide the main parts of the sentence.
- Then you will figure out the details. Write your answers in the spaces below.
- Then write the sentence again in your own words.

You may want to use definitions from the glossed text in the sections above.

Functional Analysis:

The way adolescents of today learn, play, and interact has changed more in the past 15 years than in the previous 570 since Gutenberg’s popularization of the printing press.

WHO OR WHAT: The ________

DESCRIPTOR (What): adolescents of today learn, play, and interact

WHAT HAPPENED (Action): has ______________

HOW: more in the past _______ years

COMPARISON: than in the previous _______ years

DESCRIPTOR (Time): since Gutenberg’s popularization of the _____________

What the sentence says: | My own words:
The way adolescents of today learn, play, and interact | The way ________________________________
has changed | has changed
more in the past 15 years | more ________________________________
than in the previous 570 | than ________________________________
since Gutenberg’s popularization of the printing press | since ________________________________

Write the sentence in your own words and then explain it to your partner.

________________________________________________________________________
________________________________________________________________________
EXIT TICKET

INSTRUCTIONS FOR STUDENTS:
This graphic organizer will help you keep track of information about the brain for all of the readings. Each day you will write down new information from each reading.
- First, write information about the digital revolution.
- Next, provide the three questions that the author posed, or asked, about the digital revolution.
- Then write what you learned about what we will use to help us understand these changes (what now?).

WORD BANK:
adaptive mechanism, implications, pace, penetration, screen time, technology

<table>
<thead>
<tr>
<th>Information about the digital revolution:</th>
<th>Technology has been changing at a very fast <em><strong><strong><strong>. There is unprecedented technology</strong></strong></strong></em>______. Teens have more ___________than ever before.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Resulting questions:</td>
<td>1. What are the _____________ for teen health?</td>
</tr>
<tr>
<td></td>
<td>2. What can we do to make _____________ more positive?</td>
</tr>
<tr>
<td></td>
<td>3. Will technology overwhelm the _____________?</td>
</tr>
<tr>
<td>What now?</td>
<td>[Write what we will use to help us understand these changes:]</td>
</tr>
</tbody>
</table>
### Appendix: Glossary

<table>
<thead>
<tr>
<th>Word</th>
<th>Definition</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>adaptive</td>
<td>something about a human or an animal that allows it to survive, or live in, its environment, or surroundings</td>
<td>Will the rate of change overwhelm <strong>adaptive mechanisms</strong>?</td>
</tr>
<tr>
<td>mechanism</td>
<td></td>
<td></td>
</tr>
<tr>
<td>available</td>
<td>possible to get something</td>
<td>Screen time is likely to continue to increase as the technology improves and becomes even more widely <strong>available</strong>.</td>
</tr>
<tr>
<td>context</td>
<td>the set of events or situation in which something happens</td>
<td>Consideration of the neurobiology and evolutionary history of the adolescent brain may provide some <strong>context</strong> to explore changes in our behaviors.</td>
</tr>
<tr>
<td>device</td>
<td>electronic machine (like a computer or phone)</td>
<td>Thirty percent of the time they are simultaneously using more than one <strong>device</strong>, bringing daily total media exposure time to 11.5 hours.</td>
</tr>
<tr>
<td>digital device</td>
<td>electronic machine</td>
<td>In 2010, U.S. adolescents spent an average of 8.5 hours per day interacting with <strong>digital devices</strong>.</td>
</tr>
<tr>
<td>dramatic</td>
<td>striking (noticeable) or impressive</td>
<td>The amount of screen time has been <strong>dramatically</strong> increasing.</td>
</tr>
<tr>
<td>(dramatically)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ethnicity</td>
<td>being part of a group of people who share the same language, culture, or religion, or who are the same race or nationality</td>
<td>These numbers vary by socioeconomic status, <strong>ethnicity</strong>, and geography.</td>
</tr>
<tr>
<td>evolution</td>
<td>development through history</td>
<td>It will be important to consider the neurobiology and <strong>evolutionary</strong> history of the adolescent brain.</td>
</tr>
<tr>
<td>(evolutionary)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Word</td>
<td>Definition</td>
<td>Example</td>
</tr>
<tr>
<td>------------</td>
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<td>----------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>experiences</td>
<td>events that you have lived through</td>
<td>The digital revolution gives us unique insight into how <strong>experience</strong> shapes the brain, and, in turn, how these brain changes may change our <strong>experience</strong>.</td>
</tr>
<tr>
<td>expose (exposure)</td>
<td>allow (someone) to view, come in contact with, or experience</td>
<td>Teens often use more than one device at the same time, increasing daily total media exposure time.</td>
</tr>
<tr>
<td>geography</td>
<td>location on earth; study of the earth’s physical features</td>
<td>These numbers vary by socioeconomic status, <strong>ethnicity</strong>, and <strong>geography</strong>.</td>
</tr>
<tr>
<td>implications</td>
<td>potential outcomes</td>
<td>What are the <strong>implications</strong> of the dramatic changes in the way adolescents spend their time?</td>
</tr>
<tr>
<td>insight</td>
<td>deep understanding</td>
<td>The digital revolution gives us unique <strong>insight</strong> into how experience shapes the brain.</td>
</tr>
<tr>
<td>media</td>
<td>allows communication with large numbers of people; for example, newspapers, magazines, radio, computers, and television</td>
<td>Teens often use more than one device at the same time, increasing daily total <strong>media</strong> exposure time.</td>
</tr>
<tr>
<td>minimize</td>
<td>make something as small as possible</td>
<td>How can the technology be harnessed to optimize the positive and <strong>minimize</strong> the negative?</td>
</tr>
<tr>
<td>neurobiology</td>
<td>the study of the nervous system, including the brain</td>
<td>Consideration of the <strong>neurobiology</strong> and evolutionary history of the adolescent brain may provide some context to explore these questions.</td>
</tr>
<tr>
<td>overwhelm</td>
<td>to load with an excess of something</td>
<td>Will the rate of change <strong>overwhelm</strong> adaptive mechanisms?</td>
</tr>
<tr>
<td>pace</td>
<td>how fast something moves, grows, or changes</td>
<td>The pace of &quot;penetration&quot; (i.e., the amount of time it takes for a new technology to be used by 50 million people) is unprecedented.</td>
</tr>
<tr>
<td>Word</td>
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<td>penetration</td>
<td>the amount of time it takes for a new technology to be used by 50 million people</td>
<td>The pace of &quot;penetration&quot; (i.e., the amount of time it takes for a new technology to be used by 50 million people) is unprecedented.</td>
</tr>
<tr>
<td>pervasive</td>
<td>very common; something that seems to be everywhere</td>
<td>The pace and pervasiveness of these changes raise several questions relevant to adolescent health—relevance that extends to children, teens, parents, teachers, and society at large.</td>
</tr>
<tr>
<td>positive</td>
<td>good or valuable</td>
<td>How can the technology be harnessed to optimize the positive and minimize the negative?</td>
</tr>
<tr>
<td>relevant</td>
<td>appropriate or related to what is being discussed</td>
<td>The digital revolution raises several questions relevant to adolescent health.</td>
</tr>
<tr>
<td>revolution</td>
<td>a very great change from things in the past</td>
<td>The digital revolution gives us unique insight into how experience shapes the brain.</td>
</tr>
<tr>
<td>screen time</td>
<td>amount of time a person spends in front of a screen, including TV, computers, and video games</td>
<td>The amount of screen time has been dramatically increasing.</td>
</tr>
<tr>
<td>society</td>
<td>human beings as a whole</td>
<td>The pace and pervasiveness of these changes raise several questions relevant to adolescent health—relevance that extends to children, teens, parents, teachers, and society at large.</td>
</tr>
<tr>
<td>socioeconomic status</td>
<td>the social standing or class of an individual or group</td>
<td>These numbers are a moving target and vary, or differ, by socioeconomic status, ethnicity, and geography.</td>
</tr>
<tr>
<td>survey</td>
<td>a set of questions used in research</td>
<td>These numbers are a moving target and vary by survey.</td>
</tr>
<tr>
<td>technology</td>
<td>products or methods that are developed using knowledge from science</td>
<td>The pace of &quot;penetration&quot; is the amount of time it takes for a new technology to be used by 50 million people.</td>
</tr>
<tr>
<td>Word</td>
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<td>------------</td>
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<td>-------------------------------------------------------------------------</td>
</tr>
<tr>
<td>unprecedented</td>
<td>never done or known before</td>
<td>The pace of &quot;penetration&quot; is <strong>unprecedented</strong>.</td>
</tr>
<tr>
<td>vary</td>
<td>differ; change</td>
<td>These numbers <strong>vary</strong> by socioeconomic status, ethnicity, and geography.</td>
</tr>
</tbody>
</table>
| virtual    | (virtually) a) not actual or real, but seems real  
  b) exists online | The Internet, iPads, cell phones, Google, Twitter, and Facebook unleash a **virtual** gusher of information to the teen brain. |