UNIT

3

GROW YOUR INTELLIGENCE

Lesson Descriptions

Grow Your Intelligence 1: How Your Brain Works
How does my brain work?

Grow Your Intelligence 2: You Can Grow Your Intelligence
What happens to skills that I don't practice?

Grow Your Intelligence 3: Use It or Lose It
What evidence do we have that our brains change when we learn new things?

Grow Your Intelligence 4: Word to the Wanna-Be Wise
Why is "growing your intelligence" worth the effort?

PLANNING PYRAMID

GRADE 7, Unit 3, Grow Your Intelligence

Some Students Will:

- Adopt a "growth" mindset (as opposed to a "fixed" mindset) regarding intelligence, and change their work habits to reflect this mindset.

Most Students Will:

- Be able to provide evidence that "practice makes perfect."
- Describe how the phrase "use it or lose it" applies to their daily activities.
- Describe ways to grow their own intelligence.
- Recognize ways stereotypes could cause them to limit their own opportunities.

All Students Will:

- Understand that the brain is like a muscle – it changes and gets stronger as you use it.

ROADS to SUCCESS

Grade 7 Grow Your Intelligence

Family Newsletter

Get Smart

Are people born smart, or do they get smart through hard work and practice? What kids believe can make a big difference in school performance.

The idea that intelligence cannot be changed can get in the way of learning. It's easy to see how this applies to kids who believe they're not smart. "I'm dumb, so why should I try? It won't make any difference."

Surprisingly, "smart" kids also suffer from this kind of thinking. Kids who've been told they're smart may quit at the first sign of difficulty rather than show what they don't know.

What Research Shows

Research shows that it's possible to grow your intelligence. The same brain scans used in hospital tests (MRIs, PET scans) can be

used to measure what happens when someone learns something new. Experiments show that learning actually changes your brain. And that's a message kids need to hear.

How Parents Can Help

Here are some tips to help your child develop the "growing brain" mindset:

- Teach kids to think of the brain as a muscle that gets stronger with use.
- Try not to use labels like "smart" or "dumb," which make kids think they're stuck in one place.
- Praise hard work and good thinking rather than being "smart."
- Remind kids that a challenge is fun, and that mistakes are a part of learning.

To read more about brain research, visit www.brainology.us/webnav/about.aspx.

Grade by Grade

In Grade 7, Roads to Success students study what it really takes to succeed - hard work! They'll hear the story of Michael Jordan's rise to basketball fame. (He didn't make the team in high school, and arrived at the gym at 7:00 each morning to polish his skills.) They'll learn about the amazing accomplishments of the math students of Garfield High School. (The movie "Stand and Deliver" is based on their story.) And they'll learn that no matter who you are or where you're from - success is within your reach.

Roads to Success is a new program designed to help middle and high school students prepare for their futures. This newsletter will keep you posted on what we're doing in school, and how families can follow through at home.

For more information about Roads to Success, please visit our website: www.roadstosuccess.org

Did you know?

Scientists at the University of Regensburg (Germany) saw changes in the brains of people who'd been taught to juggle just three months after the jugglers began practicing!

The **BIG** Idea

- How does my brain work?

AGENDA

Approx. 45 minutes

I. Warm Up: Brain Quiz (5 minutes)

II. Brainstorm (10 minutes)

III. Brain Tour (What's Going on in There?) (15 minutes)

IV. Human Synapses (10 minutes)

V. Wrap Up (5 minutes)

MATERIALS

- ❑ **STUDENT HANDBOOK PAGES:**
  - Student Handbook page 8, Brain Quiz
  - Student Handbook page 9, Structure of a Nerve Cell
- ❑ **FACILITATOR PAGES:**
  - Facilitator Resource 1, Brain Quiz Answer Key
- ❑ Laptop computer and LCD projector
- ❑ Overhead projector
- ❑ Chart paper and markers
- ❑ Cardboard and tape or string (for signs)
- ❑ Stopwatch

OBJECTIVES

During this lesson, the student(s) will:

- Examine their attitudes about intelligence
- Explore the functions of the brain

OVERVIEW

In this unit, students explore the nature of intelligence and learn that it's possible to "grow" their brains. Four lessons explore 1) how the brain works, 2) how practice changes your brain, 3) the "use it or lose it" phenomenon, and 4) the importance of perseverance when work is difficult (and refusing to succumb to stereotypes about why one might not be up to the challenge).

In this lesson, students consider their own attitudes about intelligence, learn about the structure of the brain, and participate in an activity designed to show the function of **neurons, synapses, axons,** and **dendrites** in performance and learning.

PREPARATION

- ❑ List the day's **BIG IDEA** and activities on the board.
- ❑ Write the day's vocabulary and definitions on the board.
- ❑ The following handouts need to be made into overhead transparencies or copied onto chart paper:
  - **Student Handbook page 8, Brain Quiz**
  - **Student Handbook page 9, Structure of a Nerve Cell**
- ❑ Visit the following websites and make sure they're accessible from your classroom. To save class time, you may wish to save a screen shot of the MRI and PET scan images.

MRI:
http://www.yalemedicalgroup.org/images/dxrad/mri-brain.jpg

PET scan:
http://www.webmd.com/depression/slideshow-depression-overview
(The first slide compares the brain activity of a healthy patient and a depressed patient.)

Brain tour:
www.alz.org
Click on "Brain Tour" and view slides 1 through 4.

- ❑ If you prefer that your students have the opportunity to individually access the **Brain Tour** (**Activity III**), make arrangements to hold class in the computer lab.

- ❑ For **Activity IV, Human Synapses,** create two signs, one that says "Neuron A" and one that says "Neuron B."

BACKGROUND INFORMATION

Like many educational programs, Roads to Success has struggled with the issue of student motivation. How do you take a kid who's already struggling academically and get him to fix his eyes on the prize – like high school graduation or a challenging career – that's half his lifetime away?

One of the ways is to change his mindset about learning. Dr. Carol Dweck, a professor and researcher at Stanford University, categorizes learners into two groups, those who believe that intelligence is "fixed" (a basic trait that's unchangeable), and those who believe that effort can improve intelligence. (She calls this a "growth" mindset.)

This series of lessons attempts to challenge the idea of fixed intelligence, and owes a debt to the stereotype threat research of Dr. Claude Steele and Dr. Joshua Aronson, and to the malleability of intelligence research of Dr. Carol Dweck and Dr. Lisa Sorich Blackwell. Dr. Aronson consulted on these lessons, and the research of Drs. Steele, Blackwell, and Dweck is reflected throughout.

Decades of research have convinced Dr. Dweck that a fixed-intelligence mindset can be damaging to students at all levels. The "I'm dumb, so why should I try?" assumption is obvious. But students who believe themselves to be smart are also vulnerable. If being smart (or athletic, or artistic) is an unchangeable "given" for students identified as such, it's tempting to quit at the first sign of difficulty. "I'm making mistakes. I'm struggling. I did poorly on this assignment. Maybe I'm not so smart after all."

The alternative way of thinking, the growth mindset, allows students to take more academic risks, make mistakes, place a premium on learning rather than performance, ask for help when needed, and redouble their efforts when work is challenging.

How can teachers foster the growth mindset in their classrooms? Dr. Dweck recommends the following strategies:*

- Teach students to think of their brain as a muscle that strengthens with use, and have them visualize the brain as forming new connections every time they learn.

- When [you] teach study skills, convey to students that using these methods will help their brains learn better.
- Discourage use of labels ("smart," "dumb," and so on) that convey intelligence as a fixed entity.
- Praise students' efforts, strategies, and progress, not their intelligence. Praising intelligence leads students to fear challenges and makes them feel stupid and discouraged when they have difficulty.
- Give students challenging work. Teach them that challenging activities are fun and that mistakes help them learn.

*SOURCE: "Smart Talking: Tell Students to Feed Their Brains." Milton Chen, http://www.edutopia.org/tell-students-feed-their-brains. Originally published 3/16/2007.

For more information, visit www.brainology.us, "About us."

VOCABULARY

Axon: part of the nerve cell that sends electrochemical messages.

Dendrite: part of the nerve cell that receives electrochemical messages.

Neuron: a nerve cell, receives and sends messages from other nerve cells.

Neurotransmitters: chemicals released by the axon, carries the message across the synapse to the next neuron.

Synapse: the space between neurons.

IMPLEMENTATION OPTIONS

In **Activity IV, Human Synapses**, you may wish to conduct an untimed, slow-motion trial run of the Human Synapses so that everybody understands the rules.

In **Activity III: Brain Tour**, if you anticipate difficultly in securing internet access in your classroom you may print out the screen grabs and create overhead transparencies to share with students.

ACTIVITY STEPS

I. Warm Up: Brain Quiz (5 minutes)

1. **SAY SOMETHING LIKE:** Over the next four weeks, we will be studying how the brain works. You may be wondering why we're studying this topic in Roads to Success, and that's a great question to ask. Knowing how your brain works can actually improve your learning. Really!

2. Let's start with a quiz to see what you think about learning and the brain.

   [Have students turn to **Student Handbook page 8, Brain Quiz**. Place its transparency on the overhead projector and read the questions aloud, as students mark T or F for each.]

3. **SAY SOMETHING LIKE:** People generally have one of two different ideas about intelligence:
   - You're smart or you're not smart, and that never changes.
     OR
   - It's possible to grow your intelligence.

   Raise your hand if you believe the first one. [Show of hands.] Raise your hand if you believe the second one. [Show of hands.] If you're not sure, you're not alone. This is a question researchers have been asking for years. And some of the answers are surprising!

II. Brainstorm (10 minutes)

1. **SAY SOMETHING LIKE:** In the next few lessons, we'll talk about new scientific discoveries about the brain, and how these affect learning. But first let's talk about what you already know. Let's consider two different questions. [Reveal chart paper on which you've written the following questions.
   - What is the brain and how does it work?
   - What happens inside your brain when you learn something new?]

2. [Use chart paper to record students' answers, beginning with the first question. For items in dispute, add all alternate opinions. Information that students (or you) don't agree on should be followed by a question mark.]

3. [Students may need prompts to answer the second question, such as: How did you

learn to talk? To read? To ride a bicycle? To shoot a basket?]

III. Brain Tour: What's Going on in There? (15 minutes)

1. **SAY SOMETHING LIKE:** Scientists have been curious about the kinds of questions you're asking for a very long time. Understanding how the brain works can help teachers teach and doctors cure illnesses. For most of history, scientists have been very limited in the ways they could answer these questions. They could compare diseased brains with healthy ones after patients died. They could observe how someone with a serious brain injury relearned the things they'd lost – talking, eating, driving a car. Fortunately, technology for seeing inside the brain has improved dramatically in the past 30 years. Scientists can now see inside the brain – no surgery required!

2. Here are two ways of looking inside of a human brain. Some brain scans (like an MRI) show the structure of the brain. [Display screen shot of an MRI. (See **Implementation Options** for suggestions.)]

3. Some (like a PET scan) show brain function. The part of the brain that a patient is using shows up in color. [Display screen shot of a PET scan.] Some kinds of brain scans do both. These pictures allow scientists to figure out how different parts of the brain are used.

4. Let's look at another website, and see what they've discovered. [Log on to www.alz.org/brain.]

5. This is the Alzheimer's Association website. Slides 1 though 4 show us what's going on in a healthy person's brain.

   [Read through the descriptions of each slide, making sure to roll the mouse over the highlighted words so students can see what part of the brain is being discussed. Items worth noting during this tour:
   - Slide 1, bullet point 3: Explain what's meant by "automatic function," things you don't have to think about doing.
   - Slide 3, bullet point 2: Scientists think that this area, the prefrontal cortex, continues to develop through your early twenties, which is why young people often need adult help in thinking through long-term plans.
   - Side 3, bullet point 4: Voluntary movement is one you control, like kicking a soccer ball or picking up the TV remote. (This is different than "automatic function," like your breathing or your heart beat.)

6. [Direct students' attention to **Student Handbook page 9, Structure of a Nerve Cell,** and place its transparency on the overhead projector. As you talk, have students fill in the sentences with the brain vocabulary at the bottom of the page.]

   SAY SOMETHING LIKE: Let's take a look at a picture of a nerve cell. Your brain is made up of these types of cells.

   Another name for a nerve cell is a neuron. You have about 100 billion of these cells in your brain. (They're obviously very tiny.) Their job is to carry electrochemical messages from one part of the body to another. Neurons don't travel; messages jump from one neuron to the next.

   Neurons don't touch each other. So how does your brain pass a message from one neuron to the next, say, from the part of your brain that smells a fire to the part that tells you what to do next – toast marshmallows? Call the fire department?

   Each neuron has a part that sends the message along. This part is called the **axon** – it's the pitcher in the baseball game. Each neuron has parts that receive the message – these are called **dendrites**. The dendrites are the baseball catchers. The axon sends the message via chemicals released into the brain, called **neurotransmitters**. These chemicals cross the short gap to the dendrites of the next neuron. This gap is called a **synapse**.

   You have many of the same neurons throughout your life. What changes is the connections between the neurons.

   Practicing a task over and over, and trying things that are a little harder each time, produces more dendrites. It's like having a whole team of catchers, each ready to "catch" the message so it can be sent on – quickly. That's what's going on inside. What it looks like outside is a person who's on top of his game.

IV. Human Synapses (10 minutes)

1. **SAY SOMETHING LIKE:** We're going to create a human model to illustrate the way messages are passed in the brain. We'll start with two people, and add more until we have a whole chain.

   [Ask two student volunteers to come to the front of the class and stand side by side. Introduce them as **neurons,** and place signs around their necks identifying them as

Neuron A and Neuron B. Have Neuron A raise his hand (the one nearest Neuron B). Identify this hand as his **axon**. Place a koosh ball or other small object into Neuron A's hand (axon) and ask him to pass it to the Neuron B. Ask the class for the scientific name of the hand into which the object was placed (**dendrite**). Ask the students if the axon (Neuron A's hand) and the dendrite (Neuron B's hand) can touch (No). Explain that the neurons must find a way to pass the object without touching. The space between Neuron A and Neuron B is the **synapse**.

Have students practice this move a few times, making sure the hand-off is always from Neuron A to Neuron B, so that it's clear that messages pass from axons to dendrites. You may wish to have students illustrate the hand-off in slow motion, with students chanting as the object is passed – axon! synapse! dendrite!]

2. When the action has been established, ask for two more students to come to the front of the room so that the four students form a chain. Practice sending the object from one end of the chain to the other, always in the same direction established with the first pair of students. Add more students if needed to get the point across.]

3. **SAY SOMETHING LIKE:** Let's see if we can make a giant chain of neurons using all the members of the class. Please do not get up out of your chairs until I give the signal.

   Once you're in your positions, we'll see how long it takes for the object to make it around the room. If you drop it, you may pick it up. If you touch each other, you have to start again at the beginning.

   [Designate one student to act as timekeeper, and others to move any furniture that's in the way. Remind students that there is to be no yelling or running, and that neurons never, ever touch each other. Ask small groups of students to quietly push in their chairs and take their places around the room – either in a large circle or a chain from one end to the other.

   When all are ready, the timekeeper says "go" and starts the stopwatch. Keep your eye on the proceedings to make sure all are following the rules.

   Have the timekeeper record the first time on the board, and ask students if they think they can improve their time on the second try. Continue for a third or fourth try if desired.

   Have students return to their seats.]

4. **SAY SOMETHING LIKE:** How did you feel during the first time trial? (Answers might include nervous, frustrated, eager for a challenge.)

   In what ways did your classmates make you feel better, or worse, about your performance?

   What did you do to get faster on later tries? [If students didn't get faster, ask how they could improve their time.]

   How did you feel when your times improved?

   What do you think the purpose of this activity was? (to show how nerve cells operate, but also to illustrate that everything we learn is hard before it's easy.) How could you use this information in your everyday life? [Allow students to respond.]

V. Wrap Up (5 minutes)

1. Place a transparency of **Student Handbook page 8, Brain Quiz,** on the overhead projector. Cover the transparency with a piece of paper so that you reveal one question at a time.

   At the bottom of the page, ask the class whether Theory A or Theory B seems most likely, based on what they've learned so far.

2. **SAY SOMETHING LIKE:** Next week, we'll examine some of the research that scientists have used to test the theory that you can grow your intelligence. Here's a hint: the title of the lesson is "You Can Grow Your Intelligence."

Brain Quiz

How does your brain work? In the next four lessons, you'll discover how humans learn. Take this True-False quiz to discover your opinions about this subject. Put a T beside each statement you think is true. Put an F beside each statement you think is false.

__T__ Your brain can grow and change throughout your life.

__F__ The best students are born smart.

__T__ People develop skills by practicing them over and over again.

__T__ Your brain changes when you practice a new skill.

__F__ If you don't succeed at a new task, you might as well give up.

__F__ Natural talent is the key to being a good athlete.

__T__ You can get smarter by working hard and practicing.

- -

Big Ideas about Intelligence:

- **Theory A**: Either you're smart or you're not smart, and that never changes.
- **Theory B**: It's possible to grow your intelligence.

Brain Quiz

How does your brain work? In the next four lessons, you'll discover how humans learn. Take this True-False quiz to discover your opinions about this subject. Put a T beside each statement you think is true. Put an F beside each statement you think is false.

____ Your brain can grow and change throughout your life.

____ The best students are born smart.

____ People develop skills by practicing them over and over again.

____ Your brain changes when you practice a new skill.

____ If you don't succeed at a new task, you might as well give up.

____ Natural talent is the key to being a good athlete.

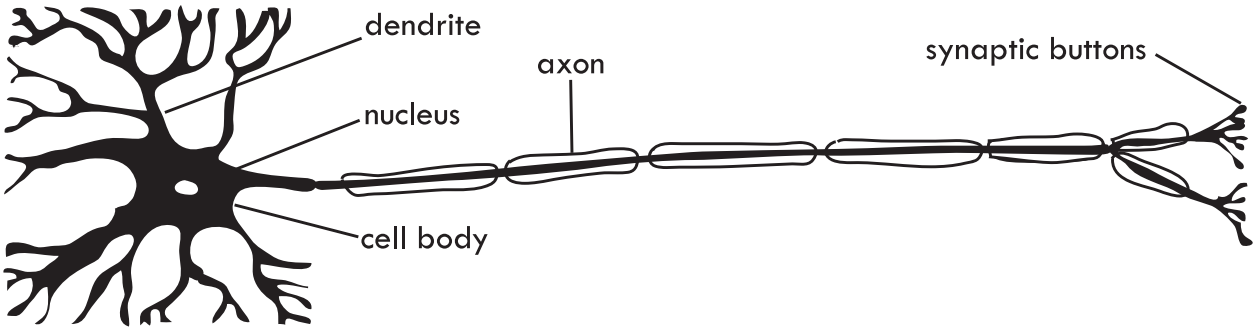
____ You can get smarter by working hard and practicing.

- -

Big Ideas about Intelligence:

- **Theory A**: Either you're smart or you're not smart, and that never changes.
- **Theory B**: It's possible to grow your intelligence.

STRUCTURE OF A NERVE CELL



Another name for a nerve cell is a(n) _____.

The part of the cell that sends messages to other cells is called a(n) _____.

The part of the cell that receives messages from other cells is called a(n) _____.

Axons and dendrites don't touch each other. The axon sends chemicals across the tiny gap between it and the dendrite. These chemicals are called _____.

The gap between neurons is called a(n) _____.

NERVE CELL VOCABULARY

synapse

neurotransmitters

neuron

dendrite

axon

You Can Grow Your Intelligence

The **BIG** Idea

- What evidence do we have that our brains change when we learn new things?

AGENDA

Approx. 45 minutes

I. Warm Up: How I Became an Expert (5 minutes)

II. Practice Makes Perfect (10 minutes)

III. You Can Grow Your Intelligence (10 minutes)

IV. Juggling Experiment (15 minutes)

V. Wrap Up (5 minutes)

MATERIALS

- ❑ **STUDENT HANDBOOK PAGES:**
  - Student Handbook page 10, How I Became an Expert
  - Student Handbook page 11, The Myth of Michael Jordan
  - Student Handbook pages 12-13, You Can Grow Your Intelligence
  - Student Handbook pages 16 and 17, Juggling Experiment
- ❑ Overhead projector
- ❑ Chart paper and markers
- ❑ Colored pencils

OBJECTIVES

During this lesson, the student(s) will:

- Create a list of evidence that brains change with learning

OVERVIEW

In this lesson, students examine evidence that practice makes perfect. Evidence includes:

- Skills they've mastered
- Michael Jordan's rise to basketball superstardom
- Juggling experiment

PREPARATION

- ❑ List the day's **BIG IDEA** and activities on the board.
- ❑ Write the day's vocabulary and definitions on the board.
- ❑ The following handouts need to be made into overhead transparencies or copied onto chart paper:
  - **Student Handbook page 11, The Myth of Michael Jordan**
  - **Student Handbook page 12-13, You Can Grow Your Intelligence** (NOTE: You will use the first page this week and the second page in next week's lesson)
  - **Student Handbook page 16 and 17, Juggling Experiment**
- ❑ If possible, print out some color copies of **Student Handbook pages 16-17, Juggling Experiment,** so that the yellow areas in the photo of the brain are evident.

VOCABULARY

Control Group: in an experiment, the group that receives no treatment.

Experiment: a procedure designed to examine the effects of a treatment. Often two groups are compared. The first group is exposed to one kind of treatment, while the other gets another kind of treatment, or often no treatment at all. Both groups are observed to see if any changes took place as a result of the treatment.

Experimental Group: in an experiment, the group that receives the treatment, and is compared to a control group that does not.

Magnetic Resonance Imaging (MRI): type of body scan used to see the structure of the part

examined, for example, the brain.

IMPLEMENTATION OPTIONS

In **Activity III, You Can Grow Your Intelligence,** you may choose to read the story aloud as a class, to assist struggling readers. Underline the key points in the article on the overhead and have students highlight those points on their handbook pages.

For **Activity IV, Juggling Experiment,** you may choose to introduce this activity by splitting the class into experimental and control groups. Then explain the differences in the treatment for each of these groups.

ACTIVITY STEPS

I. Warm Up: How I Became an Expert (5 minutes)

1. [Have students turn to **Student Handbook page 10, How I Became an Expert,** in which they describe a skill they've mastered and how they learned it.]

2. [Then have students pair up and describe this learning process to a partner, allowing a minute for each to speak.]

II. Practice Makes Perfect (10 minutes)

1. **SAY SOMETHING LIKE:** Last week, we finished up by discussing two different ideas about intelligence. Who can summarize what those ideas were? (One is that your intelligence remains the same throughout life; the other is that you can grow your intelligence.) Today we're going to look at some of the evidence that shows that you can change your brain through effort and hard work.

   You've heard the expression "practice makes perfect"? Let's hear some of your **How I Became An Expert** examples to see if it's true.

2. [Ask several students to describe their skill (and how they learned it) to the class. Include the following questions if students don't make these points themselves:
   - Were you good at this skill the first time you tried it?
   - Did you make any mistakes as you were learning?
   - How often do you practice this skill?
   - What will you do to continue to improve?]

3. [On chart paper, list students' examples of learning through practice. For example, "Luke: Typing, keyboarding class + 2 years practice."]

4. **SAY SOMETHING LIKE:** It's easy to look at someone who does something really well and not see the effort it took to get there. Our next example is a famous one – Michael Jordan. Who can tell me something about his career? [Students respond.]

   When people talk about Michael Jordan, they often describe him as a "natural athlete." But the truth may surprise you.

5. [Refer students to **Student Handbook page 11, The Myth of Michael Jordan,** and read the story aloud.]

6. [Ask students for the evidence that Michael Jordan's attitude and training propelled him to the top of his game, and add his accomplishment to the chart.]

III. You Can Grow Your Intelligence (10 minutes)

1. **SAY SOMETHING LIKE:** We've created quite a list of personal accomplishments that required lots of effort. By a show of hands, how many are convinced that you can "grow your intelligence"? [Students respond.]

   The kind of evidence we have on this chart led scientists to the idea that being talented or smart might be something people could change. Please turn to **Student Handbook page 12-13, You Can Grow Your Intelligence,** to find out more.

2. [Read the first paragraph on aloud.]

   SAY SOMETHING LIKE: This says that scientists agree that "practice makes perfect." I wonder what evidence they have?

   [Ask students to read the remaining paragraphs on page 12. Under "Build a Better Brain." Have them underline the sentence that describes how the brain changes as a result of practice.]

3. [Ask for a volunteer to read his underlined sentence aloud.

   SAY SOMETHING LIKE: So scientists say your brain connections grow when you learn something new, that you get more of these tiny branches called dendrites, which help neurons connect with other neurons to send information through the brain. I'm really curious about how they know that.

IV. Juggling Experiment (15 minutes)

1. **SAY SOMETHING LIKE:** If you were going to design an **experiment** to test whether learning changes your brain, what would you do? [Explain what's meant by an experiment, and call students' attention to remaining vocabulary words as they're introduced. Distribute colored pencils to students.]

   A few years ago, brain researchers at the University of Regensburg in Germany wanted to know if they could see a change in people's brains when they learned something new. They decided to teach people to juggle, and observe the results. How do you think they might identify changes? [Allow students to guess.]

[Have students turn to **Student Handbook pages 16-17, Juggling Experiment,** and put its transparency on the overhead, referring to it as you explain each step.]

2. The researchers worked with a group of 24 people. None of them knew how to juggle. The people were divided into two groups. Group A was the **control group**. They would not learn to juggle. At each step of the experiment, their brains would be compared with the brains of the people in Group B.

   Group B was the **experimental group**. They would learn and practice juggling. Before the experiment began, everybody in both groups received an **MRI** (brain scan). Who remembers what an MRI shows? (Allow students to respond). That's right, it shows the structure of the brain.

   [Instruct students to draw a picture or write words in each of the top two boxes as a reminder of how Group A and B were different. For example, they could draw a stick figure of someone juggling in the box labeled Group B, and write "No Juggling" in the box under Group A. **Note**: At each step of the experiment, students should write or draw something in the boxes that will help them remember the material.]

3. For three months, the people in Group B practiced juggling. The people in Group A did not. Then, all of the participants had another MRI to show what their brains looked like. What do you think the researchers discovered? [Allow students to respond.]

   [Show students the yellow areas in the diagram of the brain.] These areas show new structures in the brains of the jugglers, colored yellow to make them easier to see. No changes were found in Group A. The changes in Group B happened in parts of the brain that process information about moving objects. The jugglers' practice caused physical changes in the brain!

   In the last step of the experiment, the people in Group B discontinued their juggling – no more practice. Three months later, each person received one last MRI. Would you expect any brain changes in Group A, the people who had never juggled? (No.) What would you predict happened in the brains of Group B, the people who had once juggled and no longer practiced? (The brain structures they'd built during their three months of juggling got smaller once they stopped practicing.)

4. [Add research results to the chart begun in **Activity II, Practice Makes Perfect.**]

V. Wrap Up (5 minutes)

1. [Discuss the following:
   - What happens to the nerve cells in the brain as learning takes place?
   - What everyday evidence do we have that it is possible to "grow your intelligence"?
   - What scientific evidence do we have from the researchers in Germany?]

2. **SAY SOMETHING LIKE:** Next week, we're going to follow up on the last piece of the Juggling Experiment. What happens to your brain when you stop practicing a skill? Hint: the title of the lesson is "Use It or Lose It."

How I Became an Expert

Name one subject or activity that you do well (for example, math, basketball, playing the guitar, painting, cooking, or car repair). _____

_____

Describe how you learned it.

_____

_____

_____

_____

List two things you've done to get better at this activity.

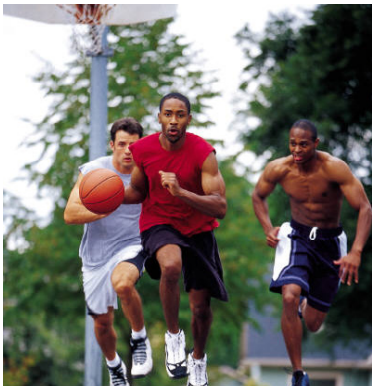
1) _____

_____

2) _____

_____

The Myth of Michael Jordan



Michael Jordan is one of the best basketball players of all time. His average points per game is the highest in NBA history – 31.5. He is one of two players to score more than 3000 points in a single season. And he has 11 MVP awards – five for the regular season and six for the finals.

It was dazzling to watch Jordan play. People often spoke of his grace on the court. They talked about his natural abilities.

But the true story is different. When he was a sophomore in high school, Michael Jordan didn't even make the team. "It was embarrassing not making the team," he says. "They posted the roster [list of players] and it was there for a long, long time without my name on it. I remember being really mad, too, because there was a guy who made it that wasn't as good as me."

Someone else might have sulked, or quit. But this setback only fueled Jordan's desire to improve. "Whenever I was working out and got tired and figured I ought to stop, I'd close my eyes and see that list in the locker room without my name on it," Jordan says, "and that usually got me going again."

The phys ed teacher at Jordan's high school, Ruby Sutton, describes Jordan's commitment to the game in those days. "I would normally get to school between 7 and 7:30. Michael would be at school before I would. Every time I'd come in and open these doors, I'd hear the basketball. Fall, wintertime, summertime. Most mornings I had to run Michael out of the gym."

Adapted from "Michael Jordan transcends hoops" by Larry Schwartz. ESPN.com, 2007.

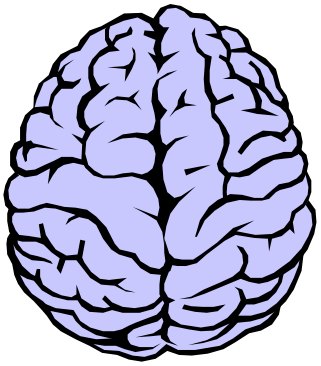
You Can Grow Your Intelligence

Mysteries of the Brain Revealed!

Practice Makes Perfect

"Practice makes perfect!" Coaches say it. Teachers say it. And now scientists are saying it, too. If you've always thought that you were smart or dumb, athletic or klutzy, artistic or not-so-artistic, think again. It turns out that old "practice makes perfect" saying is true.

The evidence is all around you. Basketball players spend time in the gym, practicing passing, shooting, and defensive skills. Their coaches watch their performances and suggest ways they can improve their technique. The more they practice, the better they get. This works for school subjects as well - from algebra to zoology.



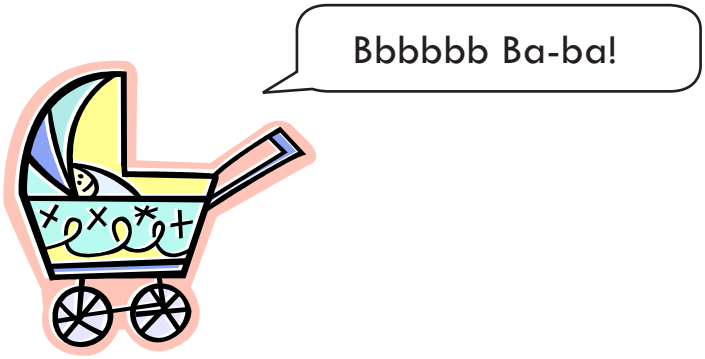
Build a Better Brain

It might surprise you to know that practice causes changes in the brain. Your brain has billions of nerve cells called neurons. To think and solve problems, your brain sends messages from one neuron to the next. Learning builds connections between neurons. When you practice a skill, you're building these connections. The more you practice, the more connections you have, the better you get at the thing you're practicing.

Out of the Mouths of Babies

Babies are a good example of "practice makes perfect." They can't understand language when they're born. They spend a lot of time listening and trying to figure out what's going on around them. They practice the sounds they hear, cooing and gurgling like they're having a conversation. Baby sounds lead to their first words, like "mama" and "bottle." People might not even recognize these words at first, but the babies keep right on practicing. They make a lot of mistakes, but no one thinks they're stupid. Everybody knows they're learning.

By age one, babies may say a word or two. By age two, they may say two or three hundred words. By age three, they can put words into sentences. The babies' brains have changed. They've built new connections. They've actually gotten smarter. Practice makes perfect!



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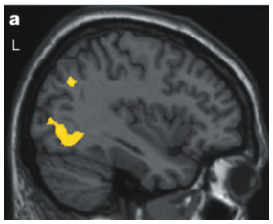
Juggling Experiment

The experiment began with two groups of people who didn't know how to juggle. There were 12 people in each group. Each person had a brain scan at the beginning of the experiment. For each of the boxes below, draw or write something that will help you remenber the differences between Group A and B.

Group A	**Group B**
The **control** group	The **experimental** group

Then, both people in both groups had MRIs (brain scans).

	
There were _____in the brains of the people in the control group.	The jugglers' brains showed _____ _____ _____.

The jugglers stopped practicing. 3 months later, people in both groups had MRIs (brain scans).

Group A	Group B
What happened to the brains of the people in Group A?	What happened to the brains of the people in Group B?

Use It or Lose It

The **BIG** Idea

- What happens to skills that I don't practice?

AGENDA

Approx. 45 minutes

I. Warm Up: Do-Now: Something I Need to Improve (5 minutes)

II. Pruning (10 minutes)

III. What am I Using and What am I Losing? (15 minutes)

IV. The Dazzling Students of Garfield High (10 minutes)

V. Wrap Up (5 minutes)

MATERIALS

- ❑ **STUDENT HANDBOOK PAGES:**
  - Student Handbook page 18, Something I Need to Improve
  - Student Handbook page 19, What Skills Am I Building?
  - Student Handbook pages 12-13, You Can Grow Your Intelligence (Out of the Mouths of Babies)
  - Student Handbook pages 20, The Dazzling Students of Garfield High
  - Student Handbook pages 21, Garfield Grads: Where Are They Now?
- ❑ Overhead projector
- ❑ Chart paper and markers
- ❑ Colored pencils

OBJECTIVES

During this lesson, the student(s) will:

- Understand that the process of pruning reduces connections between neurons when skills are not practiced
- Identify skills they're spending most of their time on, and understand the consequences for learning

OVERVIEW

In this lesson, students consider the importance of practicing skills that they find difficult. They create a bar graph of how they spend their time and discuss the implications for learning and success. They read about the brain pruning that takes place in toddlers and adolescents, and hear the story of the hard work and academic achievements of the students of Garfield High School in East Los Angeles. (The movie "Stand and Deliver" is based on their story.)

PREPARATION

- ❑ List the day's **BIG IDEA** and activities on the board.
- ❑ Write the day's vocabulary word and definition on the board.
- ❑ Think about a skill you've had difficulty with, and be prepared to describe your attempts to improve.
- ❑ The following handouts need to be made into overhead transparencies or copied onto chart paper:
  - **Student Handbook page 19, What Skills Am I Building?**
  - **Student Handbook pages 12-15, You Can Grow Your Intelligence (Children's Brain Growth)**

VOCABULARY

Pruning: process in which weak brain connections are eliminated and connections that get more use are made stronger.

IMPLEMENTATION OPTIONS

In **Activity II, Pruning,** you may choose to read the article as a class to assist struggling readers. On the overhead, underline the key points in the article and have students highlight those points on their handbook pages.

For **Activity III, What am I Using and What am I Losing?,** you may choose to make a sample bar graph charting how you spent your time during middle school.

ACTIVITY STEPS

I. Warm Up: Do-Now: Something I Need to Improve (5 minutes)

1. **SAY SOMETHING LIKE:** The title of last week's lesson was "You Can Grow Your Intelligence." Who can explain what that means? Who can offer evidence that it's possible to do this? Who can summarize the results of the juggling experiment? What happened when the jugglers stopped practicing?

   This week, we're going to focus on what happens to skills you stop practicing. The title of today's lesson is "Use it or Lose It."

2. [Have students turn to **Student Handbook page 18, Something I Need to Improve.** Model the completion of this page by describing an activity you've had difficulty with, and your attempts (successful or not) to improve. Then have the students complete the page independently.]

3. [When they've finished, have a few students share their own stories.]

4. **SAY SOMETHING LIKE:** It seems like most of us have subjects or activities we feel we're not good at. Some of us may even go out of our way to avoid those activities because they make us feel awkward or stupid. What happens if you stop trying the first, or the second, or the twentieth, time something is difficult? (You stop learning.)

II. Pruning (10 minutes)

1. **SAY SOMETHING LIKE:** There are two times during a person's life when he or she is building brain connections at a tremendous rate. Anyone wants to guess at what age this happens? [Accept guesses, and ask students for supporting evidence.]

   One period of amazing brain growth is in early childhood – from infancy to age three.

2. [Have students turn to **Student Handbook pages 13, You Can Grow Your Intelligence,** to read "Out of the Mouths of Babies." Place the transparency of this page on the overhead projector.]

   SAY SOMETHING LIKE: If I were a student in this class, I'd wonder why babies' brain growth is important to our discussion of <u>your</u> brain growth. Ideas?

3. [Have students read page 13 to themselves, then discuss what babies can teach us about learning.]

4. **SAY SOMETHING LIKE:** There's one other thing we can learn from babies. They're building lots of dendrites (brain connections). When they reach the age of three, the brain connections that are used less frequently disappear. The strongest and most-used connections survive, which allows the brain to work efficiently. This process is called **pruning**. You may have seen someone prune a tree or hedge. They cut back spindly, unhealthy branches, which helps the remaining branches grow stronger. The same thing happens inside your brain.

5. **SAY SOMETHING LIKE:** Now, let's return to the adolescent brain – yours. In case you haven't guessed, the other period of big brain growth is right before puberty, around age 11 or 12. While you were going about your everyday life in the past few years, your brain was building dendrites. Now, from ages 13 to 18, your brain will go through a pruning process to make sure that the strongest connections survive. So, if you want to be great at sports, or music, or academics, now is the time to exercise those parts of your brain. Your brains are very adaptive at this age. That's why it's easier for young people to learn to speak a new language or operate a new piece of technology than it is for adults. Scientists also think that sleep is necessary for brain pruning and growth – ten hours a night is recommended.

III. What am I Using and What am I Losing? (15 minutes)

1. **SAY SOMETHING LIKE:** In the next activity, you're going to take a look to see how you're spending your time to examine what connections you're strengthening. And what you may be in danger of losing. [Instruct students to turn to **Student Handbook page 19, What Skills Am I Building?** and place its transparency on the overhead. Distribute colored pencils to students.]

   How many of you have ever created a bar graph? [Show of hands.] Who can explain how this is done?

2. **SAY SOMETHING LIKE:** To make this bar graph, you are going to figure out how much time you spend <u>in one day</u> on each of the activities listed at the bottom of the page. Each of the small boxes equals 15 minutes, so four boxes equal one hour. The color of the boxes changes to show where one hour ends and the next begins. Let me show you how this works.

3. [Model the creation of the bar graph as follows. **Note:** you can adjust the dialogue to describe how you spend your time. (See **Implementation Options**.)]

   What's the first activity listed here? (TV) Let's say I turn on the TV when I get home at 7:00 and watch until 10:00 at night. From 7:00 to 8:00 is one hour, 8:00 to 9:00 is two hours, and 9:00 to 10:00 is three hours. I'm going to find the 3-hour mark and color the bar below it.

   I'm skipping "Video Games" and "Sports" because I don't do either one. I probably read for at least an hour a day, so I'll find the 1-hour mark and color the bar below it. And so on.

   If there are activities you do often, but don't see here, for example, playing a musical instrument or doing arts and crafts projects, write them in one of the columns to the right. You should also feel free to add a column for downtime – daydreaming or talking with friends. Don't worry if there's some overlap between your activities, for example, if you do math homework with the TV on in the background. Just make your best guess as to how much time you're spending on each.

   You can include <u>all</u> of the time you spend in class only if you're paying complete attention. So if you're with your math teacher every step, taking notes and working all the sample problems, give yourself credit for 45 minutes. If you do a half hour of homework, add another 30 minutes, for a total of an hour and 15 minutes. If you don't do either of these things, skip the math column – your total time spent on math is zero – and go on. If you're somewhere in between, give yourself credit for the time you spend paying attention and the amount of homework you do.

   [Let students know how long they have to work on their graphs, and let them know when a minute remains.]

4. [Help students summarize their findings.]

   SAY SOMETHING LIKE: Let's take a look at the skills that lead to success in school. (Reading, Math, Writing, Computer) How much time did you spend on these subjects? Are you seeing any relationship between what you're good at, and how much time you spend on that activity? Why does this happen?

   The question you may want to ask yourselves is "What's important to me, now and for

my future?" If the things that are important are not the things you're spending time on, what can you do to make a change?

SAY SOMETHING LIKE: It takes less time to make a change than you might imagine. Suppose on the average night you watch 4 hours of TV and spend 30 minutes on math work. If you spent one half hour less on TV each night, and used that time to practice math problems instead, you could double the time you spend on math each day. At the end of a school week, that little bit would add up to two and a half hours. At the end of the month, you'd have spent 10 extra hours on math—all from 30 minutes each night!

[Ask students to share examples of activities where they need to increase their effort in order to grow their intelligence. Then examine what activity(s) they could cut back on.]

IV. The Dazzling Students of Garfield High (10 minutes)

1. **SAY SOMETHING LIKE:** Our last activity today is a case study of a group of high school students who performed far beyond their own expectations. How they managed to do this will probably not surprise you, now that you know what's required to grow your intelligence.

   Please turn to **Student Handbook page 20, The Dazzling Students of Garfield High**. I'd like you to read this page with a partner. Here are the questions I'd like you to consider as you read. [Display the following questions on the board, overhead, or chart paper:
   - What do we know about Garfield High?
   - What was the students' goal?]

V. Wrap Up (5 minutes)

1. **SAY SOMETHING LIKE:** Let's make a list of what we learned about the brain today. [Write students' suggestions on chart paper. These might include the need for practice, that mistakes are okay, use it or lose it.]

2. Next week, we'll complete our lessons on growing your intelligence. We'll look at the life stories of a few more highly successful people, learn new ways to describe intelligence, and think about advice we might have for younger students who haven't heard about this research. I'll see you then!

Something I Need to Improve

Name one subject or activity (for example, sports, music, or art) that you struggle with.

_____

Describe why you find it difficult, or give an example of a time you had difficulty.

_____

_____

_____

List two things you've done to get better at this activity.

1) _____

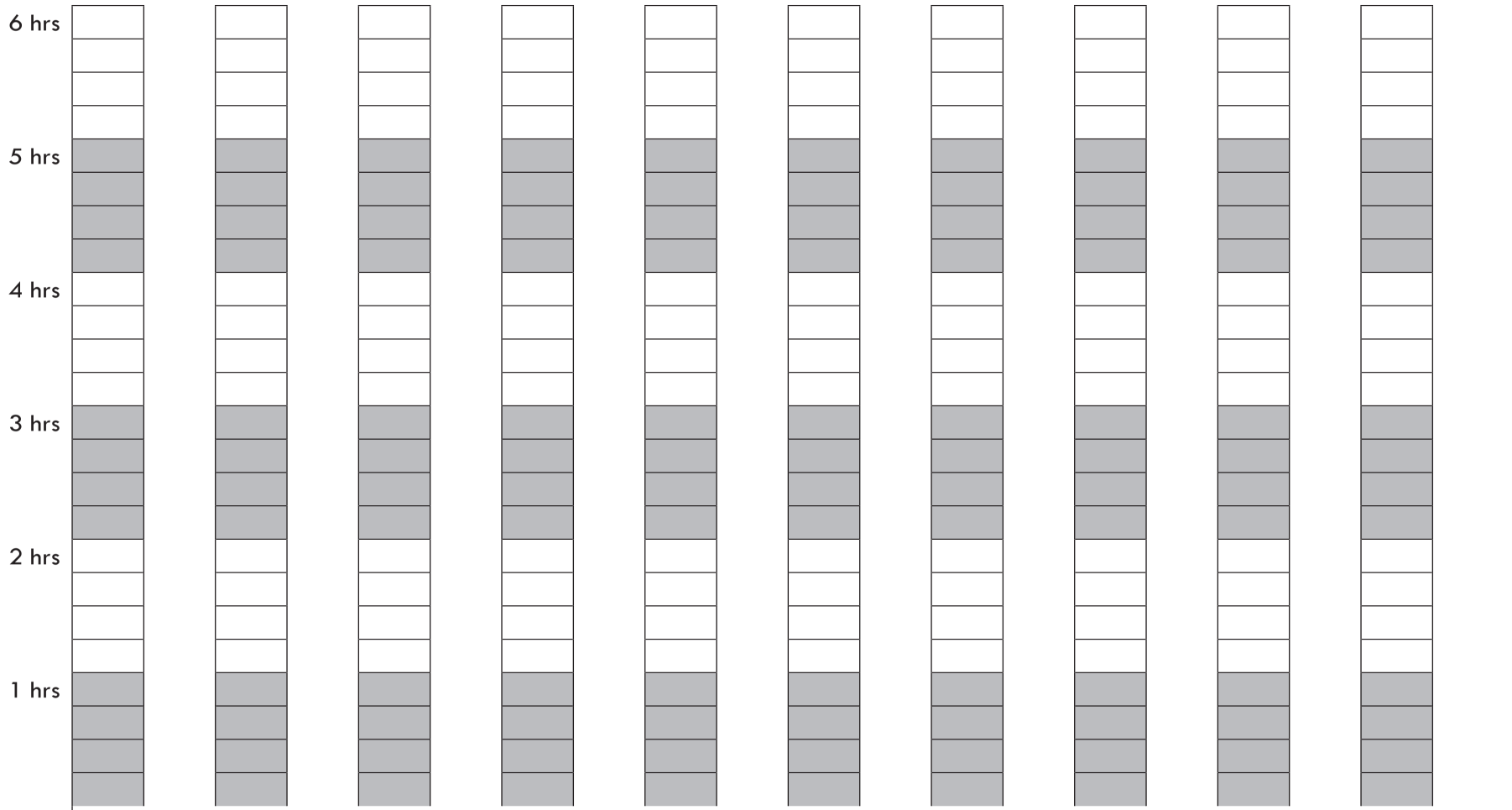
_____

2) _____

_____

What Skills Am I Building?

Think about how you spend a typical day. Create a bar graph to show how many hours you spend on each of the activities below. Example: If you pay attention in math class (45 minutes) and spend a half hour on homework (30 minutes), you can color in 5 spaces (1 hour, 15 minutes) in the "math" column.



ACTIVITY:	TV	Video Games	Sports	Reading	Math	Writing	Computer	Club or Mentoring Program	Other _____	Other _____

The Dazzling Students of Garfield High

The students who attend Garfield High School in East Los Angeles are not rich. Nine out of ten students qualify for free lunch. They are not privileged. Many of their parents didn't finish high school. But they are famous.

Years ago, Garfield High School students dazzled people across the country. They became experts at the most difficult math high schools have to offer – calculus.

Their teacher, Mr. Escalante, did not believe in failure. He believed in preparation. He made his students believe, too. Here are the things they did to become top math students.

- They worked hard in math in junior high, no matter how poorly they had done in earlier grades.
- They came to school early and stayed late when they needed extra help.
- They attended special summer school courses to improve their skills.
- They cheered and chanted to get themselves ready for the work ahead.
- They had a goal – passing the Advanced Placement Calculus Test – the hardest standardized math test in the country.

Did their effort pay off? It did. One year, 18 students passed the test – a huge number for a test so difficult. Each year, more students attempted the test. Five years later, 85 students passed. The Garfield students went on to some of the best colleges in the country, and some of the best jobs anywhere.

Garfield Grads: Where Are They Now?

Dr. Armando J. Islas
Dentist/Surgeon, Policeman, CEO
Class of 1976

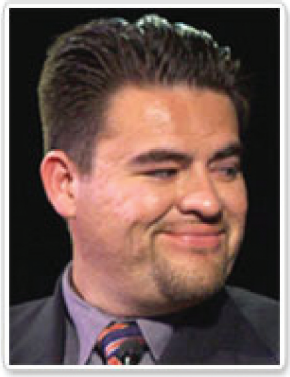
Dr. Islas was the first in his family to go to college. He attended Harvard.

What he learned from Mr. Escalante:
"You can do anything you want to do and nobody can put a ceiling on how high you can go."

Juanita Gutierrez
Director of Public Relations, HSBC
Class of 1988

Ms. Gutierrez attended Wellesley College (Massachusetts) and the London School of Economics.

What she learned from Mr. Escalante:
"He made sure that students . . . came back after their first year of college and told us about their college experience . . . That one student coming to tell us about her experience changed my life forever."



Thomas I. Valdez
Research Engineer, Jet Propulsion Laboratory
Class of 1991

What he learned from Mr. Escalante:
"He gave me the ability to push myself and, yes, I can do whatever I want."

PHOTOS: Micheal Hall Photography (www.michealhallphotography.com)
STORY: The Futures Channel, Inc. (www.thefutureschannel.com)

Word to the Wanna-Be Wise

The **BIG** Idea

- Why is "growing your intelligence" worth the effort?

AGENDA

Approx. 45 minutes

I. Warm Up: Career Match (5 minutes)

II. Career Match Discussion (10 minutes)

III. "Grow Your Intelligence" Review (10 minutes)

IV. A Word to the Wise Letter (15 minutes)

V. Wrap Up (5 minutes)

MATERIALS

- ❑ **PORTFOLIO PAGES:**
  - Portfolio page 20, Grade 7 Skills Checklist (Grow Your Intelligence Only)
- ❑ **STUDENT HANDBOOK PAGES:**
  - Student Handbook page 22, Word to the Wise Letter
- ❑ **FACILITATOR PAGES:**
  - Facilitator Resource 1, Career Match
  - Facilitator Resource 2, Career Match Answers
- ❑ Overhead projector
- ❑ Chart paper and marker

OBJECTIVES

During this lesson, the student(s) will:

- Consider the ways in which stereotyping can limit aspirations
- Review behaviors needed to grow your intelligence

OVERVIEW

In this lesson, students are asked to match twelve photos of people with their careers. Students discuss how a person's appearance, gender, or race influenced their ideas about career possibilities, and how such stereotypes can limit their own aspirations. The class reviews what they learned about growing your intelligence, and each student writes a letter to a sixth grader advising him or her on this topic.

PREPARATION

- ❑ List the day's **BIG IDEA** and activities on the board.
- ❑ Write the day's vocabulary words and definitions on the board.
- ❑ The following handouts need to be made into overhead transparencies or copied onto chart paper:
  - **Facilitator Resource 2, Career Match Answers**
  - **Student Handbook page 22, Word to the Wise Letter**
- ❑ Make color copies of **Facilitator Resource 1, Career Match** (half the number of your largest class). Cut up the photo cards and career strips and place each complete set in an envelope or zip-lock bag. (This will be used as a class set.)
- ❑ Make copies of **Facilitator Resource 2, Career Match Answers**. If you want students to be able to highlight their answers, you'll need a copy for each student (or pair of students).

VOCABULARY

Perseverance: (from persevere) quality of persisting in an idea, purpose, or task despite obstacles.

Persistence: (from persist) quality of continuing firmly and steadfastly despite obstacles.

Stereotype: an oversimplified image or idea held by one person or group about another. (For example, "Teenagers have no respect for their elders" is a stereotype.)

IMPLEMENTATION OPTIONS

In **Activity II, Career Match Discussion,** you may wish to have students continue to work in pairs to find the people whose backgrounds are similar to theirs.

For **Activity II, Career Match Discussion,** you may organize the students into groups of four to cut down on color printing. Make sure to give specific guidelines to make sure everyone is involved in the decision. You may want to use a Kagan strategy to assign roles so everyone gets to talk.

In **Activity IV, A Word to the Wise Letter,** if your students struggle with writing, you may wish to reduce the number of required "facts" to three and/or allow students to include information about the brain as bullet points. In addition, you may choose to have students complete this exercise in small groups with one person writing down the group's thoughts.

For **Activity IV, A Word to the Wise Letter,** you may choose to send your students' letters to sixth-graders in your district.

In **Activity V, Wrap Up,** if time permits, you may wish to allow two minutes for students to describe their ideas for improvement to their partners before sharing them with the class.

ACTIVITY STEPS

I. Warm Up: Career Match (5 minutes)

1. [Review the previous week's work as follows:]

   SAY SOMETHING LIKE: Who believes it's possible to grow your intelligence? In a few minutes, you'll have the opportunity to share your knowledge with sixth-graders who will soon be where you are today. But first, I'd like you to consider twelve more people. They are similar to Michael Jordan and the students of Garfield High School because each of them is top in his or her field. Let's see how well you can predict their careers.

2. [Pair students. Distribute **Facilitator Resource 1, Career Match,** one set of 12 photo cards and 12 career strips for each pair of students. (See **Implementation Options.**)]

II. Career Match Discussion (10 minutes)

1. **SAY SOMETHING LIKE:** Please remove the materials from your bag or envelope and place them on your desk. You should put all of the photo cards on one side, face up, and all of the word strips on the other side, face up. You'll notice that all of the word strips are the names of careers. [Define any careers with which the students are unfamiliar.] On each of the photo cards is a picture of someone who has one of these careers. Your assignment is to match each career name with the person who you think has the job. You should talk through your choices with your partner. When you are finished, we'll find out more about these people, who they are, and how they got where they are today. You have five minutes.

2. [Give students 4 minutes to work, and a 1 minute warning when time is almost up. If students protest that they don't have enough information, acknowledge that they don't have much to base their decisions on, and that they should just do the best they can.]

3. [When students have finished,] **SAY SOMETHING LIKE:** This was a very difficult job! You had nothing to go on but a person's appearance. Before we find out who's who, let's talk for a minute about how you made your decisions. [Ask the following questions, and ask students to explain their answers. **Note:** they should be courteous in describing any of the people pictured.
   - Did you make any matches based on what a person was wearing?
   - Did you make any matches based on a person's gender, that is, whether a job is more likely to be held by a man or a woman?
   - Did you make any matches based on a person's race, for example, whether you

thought a white person was more likely to have a particular job than an African-American person, or vice versa?]

4. **SAY SOMETHING LIKE:** Let's reveal the results and see how you did.

   [Quickly distribute **Facilitator Resource 2, Career Match Answers,** and have students review their answers.]

5. [Refer students to the vocabulary word on the board, and explain the definition of **stereotype**.]

6. **SAY SOMETHING LIKE:** In this activity, you had no choice but to base your answers on stereotypes – ideas about groups of people and the types of careers they might have. What are some reasons to question stereotypes in real life? (They might cause you to misjudge people and keep you from getting to know them.)

   You may not have considered that stereotypes may also cause you to misjudge yourself. Stereotypes might keep you from reaching your goals or considering all the opportunities available to you. Can anybody give an example of how your own stereotypes have affected you, or someone you know? (Girls can't/don't . . . people from a small town can't/don't…people from my race or ethnic group can't/don't …)

7. **SAY SOMETHING LIKE:** If some of the people in these photos had gotten trapped by this kind of thinking, they wouldn't be where they are today. Let's see if you can find examples of this.

   [Have students look for <u>one</u> of the following, depending on which describes your school setting best. Instruct them to highlight the phrases that prove their point, and provide an example if needed.
   - 3 people who came from very small towns (Homer Hickam, Tari Hampe Deneen, Nadia Begay)
   - 3 people who are immigrants (Ang Lee, Agustin Lao-Montes, Michaela)
   - 3 people who grew up in a large city (Neil DeGrasse Tyson – NYC, Sonia Sotomayor – NYC, Sampson Davis – Newark, NJ)]

III. "Grow Your Intelligence" Review (10 minutes)

1. **SAY SOMETHING LIKE:** People often describe themselves as "smart" or "not so smart," or "good" or "bad" at a particular subject or activity. As you've learned, these labels

aren't particularly useful. Why? (Anyone can get "smarter" by working hard, labels could prevent you from trying or cause you to fall apart the first time you fail.) I'd like to offer you some adjectives to use in place of these old labels. [Write the following on the board:
Persistent
Persevering
Hard-working]

2. [Refer to the vocabulary definitions of **persistent** and **persevering**, making sure students understand the definition of "obstacles." Have someone define "hard-working" and give an example.]

3. **SAY SOMETHING LIKE:** For our last activity in this unit, I'd like you to consider everything you've learned about growing your own intelligence. It's time to pass that knowledge on. Each of you is going to write a note to a sixth-grader describing why it's so important to be persistent, hard-working, and persevering. Let's summarize some of the things you've learned about growing your intelligence that you might want to include in your note.

4. [List the following categories on the board to help students to recall what they've learned:
   - Your Brain
   - Practice Makes Perfect
   - Use It or Lose It
   - Stereotypes

   [Create a T-chart. At the top of the left-hand column, write "message." At the top of the right-hand column, write "evidence."]

   SAY SOMETHING LIKE: Let's think of this in terms of advice (messages) you want to pass along, and evidence that what you're saying is true. For example, my message might be that even superstars have to practice to get where they are. I'll abbreviate this as "even superstars practice" in the "messages" column. [Demonstrate.]

   My evidence would be that Michael Jordan didn't make his high school basketball team, and came to the gym at 7:00 in the morning to practice his skills. I'll abbreviate this as "Michael Jordan didn't make team, practiced at 7a.m." [Demonstrate.]

Notice that these aren't whole sentences, just ideas to help you when you write your letter.

[Let students know it's okay for one person to present an idea for a message, and another to follow up with evidence. Have students make suggestions for ideas to include in the letter until all topics have been covered.]

IV. Word to the Wise Letter (15 minutes)

1. [Have students turn to **Student Handbook page 22, Word to the Wise Letter,** and place its transparency on the overhead. Read the text aloud, and model how to create the next sentence from the ideas listed on chart paper.]

   SAY SOMETHING LIKE: The first thing I want to talk about is Michael Jordan, so I'd look at my notes to get an idea of what I wanted to say. I might say something like "Lots of people think that talented athletes don't have to work hard, but this isn't true." Then I'd explain how hard Michael Jordan had to practice: "Michael Jordan didn't even make his high school basketball team. This made him determined to work harder than ever." Then I'd explain how this idea applies to any subject in school.

   I want your letters to be very encouraging, and to make a good argument for the need to work hard as a way to grow your intelligence. I'd like each of you to include at least 5 facts – pieces of advice or evidence – in your letter.

2. [Let students know they will have about 15 minutes to write their letters. Circulate throughout the class and provide help as needed. Remind students when they have only five minutes remaining to work, and let them know when they have a minute left to wrap things up.]

V. Wrap Up (5 minutes)

1. Conclude the unit by asking students to consider one skill they'd like to get better at, and one step they could take to make that happen. Have volunteers share their ideas with the group.

SKILLS CHECKLIST

Direct students' attention to **Portfolio page 20 Grade 7 Skills Checklist**. Have students complete the skills checklist questions for Grow Your Intelligence skills.

GROW YOUR INTELLIGENCE
I can …

Give evidence that it's possible to improve a skill by practicing.	❑ not at all	❑ somewhat	❑ very well
Describe ways to "grow my intelligence."	❑ not at all	❑ somewhat	❑ very well
Recognize that stereotypes may cause me to limit my own opportunities.	❑ not at all	❑ somewhat	❑ very well

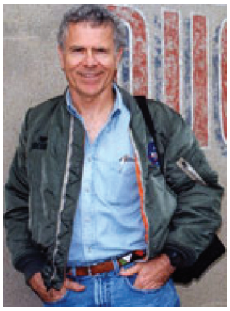
Career Match

Astrophysicist (studies space)	**Basketball player**
Carpenter	**Cartoonist**
College Professor	**Doctor**
Electrician	**Film Director**
Restaurant owner	**Author/ Rocket scientist**
Supreme Court Justice	**Wildlife biologist**

Career Match

Photo credit: Bruce Caines

Career Match



Career Match Answers

Astrophysicist

Neil DeGrasse Tyson is the Director of the Hayden Planetarium. He has written 9 books and hosted science shows on PBS. He was born and raised in NYC, and graduated from Bronx Science HS. He has his BA from Harvard and a PhD from Columbia.

Photo credit: Bruce Caines

Film Director

Ang Lee was born in Taiwan. He has a BA from the University of Illinois and an MA from NYU. He has directed more than ten well-known films (and won an Academy Award for one of them). But he was not an instant success. He spent 6 years keeping house while his wife worked before breaking into film.

Restaurant owner

Tari Hampe Deneen is an entrepreneur – someone who started her own business. She opened Tari's Café in 1989 in Berkeley Springs, WV (population: 700). She won a WV "Celebrate Women" award in 1999. She sold the restaurant in 2006, and later began a career as a singer.

Supreme Court Justice

Sonia Sotomayor grew up in a housing project in the South Bronx, New York City. Sotomayor got scholarships to Princeton, then Yale, where she earned her law degree. She became a lawyer, then a judge. In 2009, she became a Supreme Court Justice, one of nine judges on the highest court in the U.S.

College Professor

Agustin Lao-Montes is an Assistant Professor at the University of Massachusetts, Amherst. He is an expert in Latino and Puerto Rican studies. He has a BA from Catholic University of Puerto Rico, and an MA and PhD from SUNY Binghamton.

Basketball player

Nadia Begay learned basketball from her mom, and joined her first team in the fourth grade. As a senior, she was her state's high school player of the year. College scouts never visited her "one-stoplight" town (Kirtland, NM), so she sent videos to schools across the country. She went on to play Division I basketball for Boise State.

Career Match Answers

Carpenter

Michaela grew up in Germany, where she studied to be a kindergarten teacher. After arriving in North America, she worked as a nanny and a security officer. She learned her carpentry skills in a community college program.

Electrician

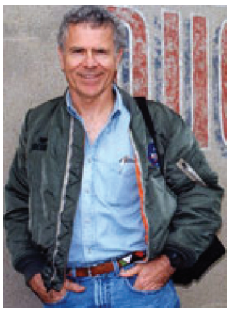
Geri worked as a licensed practical nurse and took business courses in college. She got into a trade-school electrician program after a 4-year wait. She's good at repairing things. She loves seeing city lights and knowing she had a part in putting them there.

Wildlife biologist

Matt Varner grew up in the small town of Kingwood, WV. He and his wife worked many jobs to put themselves through college. Varner has worked as a fish and wildlife biologist in West Virginia, Nevada, and Alaska. In 2007, a new species of springsnail was named after him.

Doctor

Sampson Davis grew up on the tough streets of Newark, NJ. He and two friends (Rameck Hunt and George Jenkins) promised each other that they would all grow up to be doctors. They wrote a book called "The Pact" to tell how they did it. Together, they started The Three Doctors Foundation to inspire city youth to achieve their dreams.



Author/ Rocket scientist

Homer Hickam was born and raised in Coalwood, WV. He's a writer, a scientist, a SCUBA diver, and an amateur paleontologist. He has written 12 books, including "Rocket Boys," which was later made into the movie "October Sky." He graduated from Big Creek High School, and has a BS from Virginia Tech.

Cartoonist

Liza Donnelly's cartoons have appeared on websites, in books, in newspapers, and in magazines from "Good Housekeeping" to "The New Yorker." She has written and illustrated seven children's books about dinosaurs. She lives in New York City, and teaches at Vassar College.

Word to the Wise Letter

Use what you've learned to coach a sixth-grader on how to grow his or her intelligence. Assume that you really want this student to succeed. Complete this letter by writing your advice on the lines below.

Date: _____

Dear _____,

Welcome to _____ (name of school). We know you'll want to learn a lot in this year. Our class has been studying the brain, and we have some advice.

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

Work hard – it's worth it!

Sincerely,

_____ (Your name)