# ADVANCE U:
## THE TALENT MACHINE

GEAR UP FOR THE PROMISE
K20CENTER ↔ OKCPS

The **K20 CENTER FOR EDUCATIONAL AND COMMUNITY RENEWAL** is a statewide education research and development center that promotes innovative learning though school-university-community collaboration. Our mission is to cultivate a collaborative network, engaged in research and outreach, which creates and sustains innovation and transformation through leadership development, shared learning, and authentic technology integration.

The **Gaining Early Awareness and Readiness for Undergraduate Program** (GEAR UP) is a federal grant provided by the U.S. Department of Education to help students prepare for and pursue a college education.

In 2012, the **K20 GEAR UP** program started its work with sixth and seventh graders and will continue working with these students as they move through middle school, high school, and into higher education.

**GEAR UP FOR THE PROMISE** (Promotion of Readiness through Opportunities that Motivate and Increase Student Expectation) is K20's GEAR UP program with Oklahoma City Public Schools. PROMISE specifically seeks to:

- Increase the percentage of PROMISE students who are academically prepared for higher education and future careers upon graduating from participating schools
- Increase high school graduation rates and higher education enrollment rates of participating PROMISE schools
- Increase PROMISE students' and families' knowledge of higher education options, preparation, and financing.

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# WHAT IS THIS GAME ABOUT?

Welcome to Advance U: The TALENT Machine, a fun and engaging way to introduce students to the concepts of neuroplasticity and mindset theory.

In this game, a new program has been enacted at McLarin Academy. A machine has been created that measures a student's natural talents and then determines the job and related major that student is best suited for. Unfortunately, this machine ignores a human's capability to learn and grow and limits the students' options to those skills they already possess.

To reclaim their educational autonomy and stop the machine from being adopted by more schools, it is up to the students of McLarin Academy to prove that the TALENT Machine will not work.

To argue against the machine, students must learn about neuroplasticity and mindset; then they must use that knowledge to prove the machine's results are invalid by teaching other students, teachers, and eventually the school president about how the human mind can continue to learn and grow beyond the limits of one's own natural talents.

Through the game, students will come to understand the brain's ability to learn and change and how their own personal mindset can affect their ability to learn.

The purpose of this guide is to support the effective integration of Advance U: The TALENT Machine into your classroom. This teacher's guide is designed to help you:

- Gain familiarity with the game: Providing an overview of the game content and the learning objectives it is designed to cover.
- Explain the game: Providing information on how students play the game.
- Extend the lessons: Providing information for additional activities and readings that will help you pre-teach, extend, and consolidate the game's learning objectives.

## LEARNING OBJECTIVES

**By the time students complete Advance U: The TALENT Machine they will be able to accomplish the following objectives:**

1. Neuroplasticity: Students will be able to explain the concept of neuroplasticity, describing how learning occurs in the brain and the way the brain changes as they learn.
2. Mindset: Students will be able to explain the concept of mindset and identify their own mindsets and those of others.
3. Changing Mindset: Students will be able to explain how they can change their own mindsets and help others to do the same.

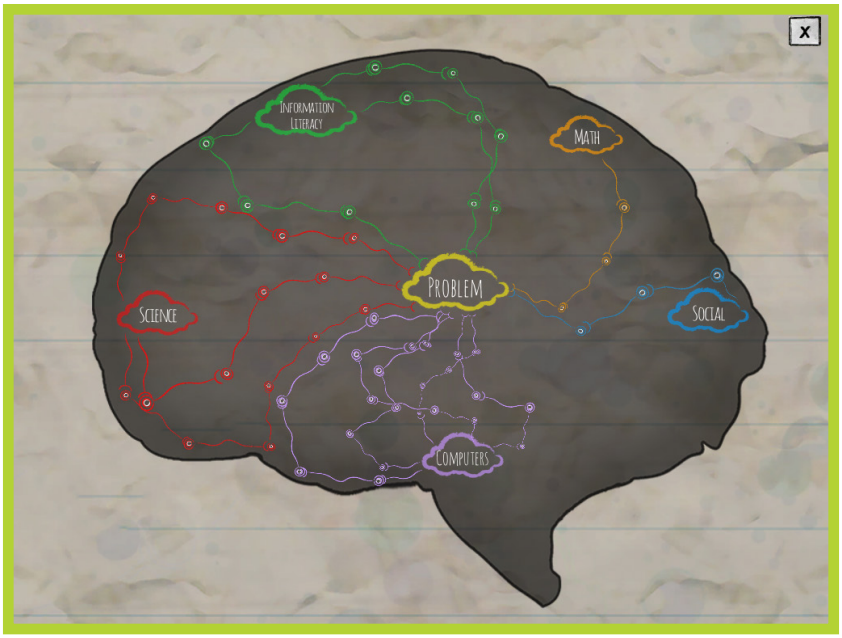

# THE SCIENCE

## Neuroplasticity

Neuroplasticity is used to describe the ability of the brain to change over time. The human brain is made up of about 86 billion brain cells, or neurons, that are connected together with wire-like tendrils called axons (that transmit information) and dendrites (that receive information). These form an ever-changing web of complex connections. Every memory, skill, thought, and feeling a person has exists because of these connections.

Learning something new causes the brain to make new connections, and then repeated study or practice causes those connections to grow stronger and transmit the information faster. When faced with a challenge, the brain tries to use its current connections to solve the problem. If that doesn't work, it forms new connections until it finds a solution. Although neural connections get stronger with repeated use, the opposite is also true. The less a neural pathway is used, the weaker the connections become.

Robert Calfee (2006) identifies neuroplasticity and an understanding of how the brain learns as key to academic advancements in education. Explicitly teaching students about and helping them understand the concept of neuroplasticity has been shown to dramatically increase student performance. Dubinsky, Roehrig, and Varma state that "the neurobiology of learning, and in particular the core concept of plasticity . . . affect how students think about their own learning" (2013, p. 317).




## Academic Mindset Theory

The way in which a person views his or her own learning is considered to be one's academic mindset. There are two academic mindsets: growth mindset and fixed mindset. Students with a fixed mindset believe their learning to be a product of their ability. Such students rely on "talent" and "given strengths" to frame their learning experiences. These students also see failure and challenge as support for their lack of ability or talent. On the other hand, students with a growth mindset believe their learning to be a product of hard work, effort, and persistence. As such, students with a growth mindset view failures and challenges as a way to grow and learn. These students meet struggles with persistence in order to continue learning.

When faced with a challenge that natural talent alone cannot overcome, a student with a fixed mindset will give up, believing he or she lacks the ability to overcome the obstacle. A student with a growth mindset, however, will attempt new strategies and discover alternative means to solve the problem, seeing it as an opportunity to learn and expand their knowledge (Mangels, Butterfield, Lamb, Good, & Dweck, 2006).

In one study, researchers showed that a growth mindset intervention was able to decrease students' anxiety and increase self-efficacy (Mueller & Dweck, 1998). A growth mindset helps students understand that failure is a natural aspect of the learning process and that improvement is always possible. Thus, a growth mindset encourages continued practice to learn, improve, and overcome, while a fixed mindset can lead a student to plateau, giving up when their natural talents and persistence fail to be enough to overcome an obstacle.

Studies have also found evidence that the way teachers provide feedback can have a profound effect on their students' mindsets and resulting achievements. For example, praising ability (e.g., "You did a great job! You must be a natural.") instead of effort (e.g., "You did a great job! You must have worked really hard.") could promote a fixed mindset and become a detriment to motivation (Mueller & Dweck, 1998). For that reason, Dweck suggests that teachers be aware of the way they provide feedback to students.

According to Mueller and Dweck (1998), to foster a growth mindset, students must be exposed to feedback and encouragement that focuses on effort and practice rather than talent. Emphasis should be placed on trying new strategies to overcome obstacles and challenges. The goal should be self-improvement and learning, rather than success or winning. For example, when a task seems easy to a student, feedback messages such as "Wow! You must be really smart!" should be replaced with messages that focus on

continued improvement like "That seemed really easy for you. Let's kick it up a notch so you can have a fun struggle." Most importantly, failures should be looked upon as opportunities to learn and not as confirmation of one's inability to succeed. Mueller and Dweck (1998) found that, in many cases, simply teaching the concept of growth mindset leads to student improvement. However, it is important that, when giving feedback and instruction related to mindset, the messages are explicit. Instruction should encourage learning, changes over time, and praise for hard work.

| EXAMPLES OF FIXED MINDSET MESSAGES | EXAMPLES OF GROWTH MINDSET MESSAGES |
|---|---|
| "You must be really smart." | "You must have worked really hard." |
| "You made that look really easy! Good job!" | "Let's do something hard that we can learn from, not something easy and boring." |
| "If that was too hard for you, we can try a different activity." | "That was hard, and it didn't stop you." |
| "You are picking up on this really quickly and easily. You're a quick learner." | "You did that so quickly and easily. Let's make a better use of your time. Let's step it up a notch so you can learn something." |

## Achievement Goal Theory

Achievement goal theory defines three basic types of goals: performance, avoidance, and mastery (learning) (Elliott & Dweck, 1988). According to achievement goal theory, people base goals on either social perception (performance/avoidance) or mastery of a skill (learning). Performance goals are oriented toward looking better than one's peers, while avoidance goals are oriented toward avoiding negative perceptions. Meanwhile, mastery goals have been linked with higher motivation and achievement than goals based on innate ability or performance. Students with a fixed mindset tend to adopt performance/avoidance goals, while students with growth mindset tend to adopt mastery goals.

In cases where a student succeeds at a goal, mastery goals demonstrate an improvement in motivation, but this is often lost when the student meets the limits of their current skill level (which is congruent with mindset theory). In contrast, avoidance goals provide the lowest level of motivation.

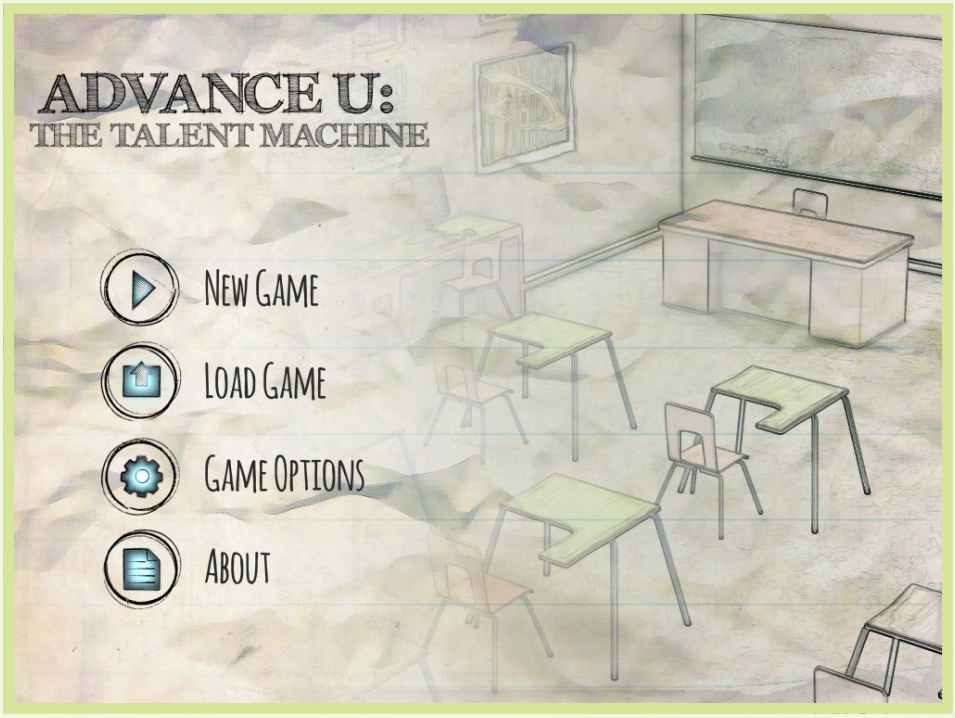
Grant and Dweck's research (2003) suggests that goals based on a specific outcome (or based on learning and improving) are almost always more effective at improving achievement and motivation than goals meant to validate a personal belief or compare oneself to a perceived norm.

# HOW TO PLAY THE GAME

Advance U: The TALENT Machine is a three-act, interactive story in which students will learn about neuroplasticity and mindset by exploring these concepts through interacting with a large cast of characters. Each character within the game has his or her own distinct personality, problems, and mindsets for students to discover. As the story advances, students have the opportunity to apply what they've learned to help these characters change their mindsets and overcome the obstacles in their own lives.

By using this method, students are able to see how their actions and feedback can affect another person's mindset and can compare their own thinking to those of the characters to determine what their own mindsets are. At the same time students' understanding of the concepts taught throughout the game are tested both through their application of the information and through metacognitive questions that require them to think about how the different characters in the game reflect the concepts.

## THE INTERFACE




### The Main Menu

**New Game** allows students to start a new game of Advance U: The TALENT Machine.

**Load Game** allows players to continue a game already in progress (disabled if they haven't played before or if they have completed their prior game).

**Game Options** brings up a menu that will allow students to switch the game's language from English to Spanish and adjust the volume.

**About** brings up a screen giving more information about the K20 Center

### The In-Game Menus

**Options** allows for volume adjustment and returning to the main menu.

**Quest Log** lists all current and completed quests.

**Mind Map** displays the student's current level in each skill depicted through a series of connected skill points (whenever the student gains additional skill points, new connections will form on the Mind Map to represent their growth).

**Notebook** contains all of the instructional concepts learned throughout the game.

**Help** displays information about the various menus and how to play the game.

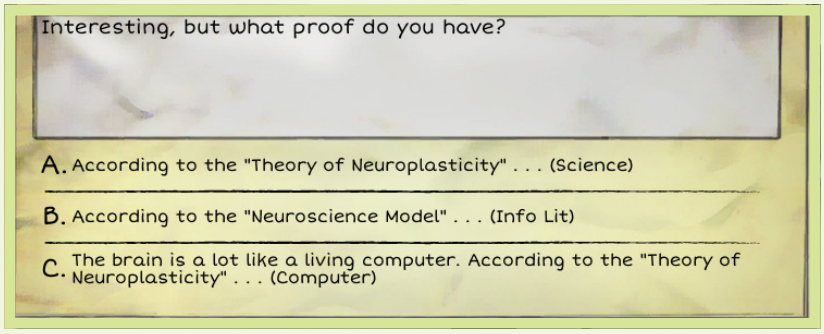
## CONTROLLING THE AVATAR

### Navigation

To move around the game world, students can click where they want to go, and the avatar will move there. To move between locations, the game uses warp points, which are indicated by highlighted doorways that the student can click on. Upon reaching the doorway, a new location will load with the player's avatar ready to explore it.

### Interaction

To investigate objects or speak with other characters, students can click on them to bring up an interaction menu. While the menu for interacting with NPCs and objects look slightly different, they both function the exact same way. Students pick their responses to the on-screen dialogues from a short list and, at certain points, will find themselves faced with skill actions they must attempt.

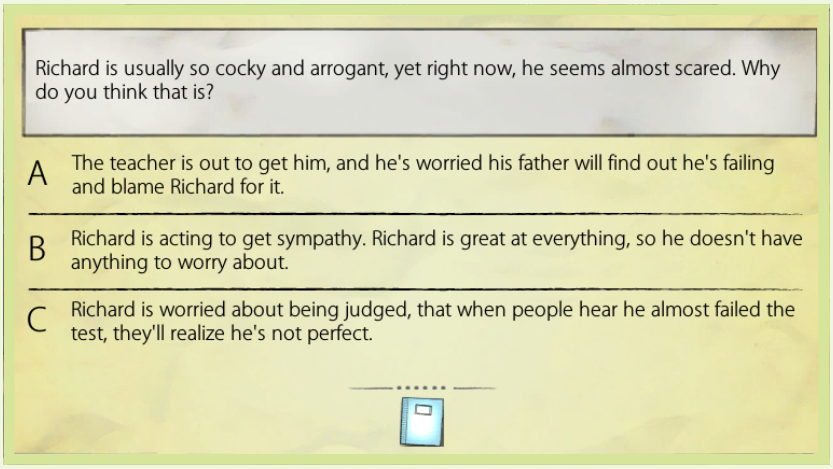



### Skill Actions

The skill actions represent facing and overcoming challenges. When students come to a skill action, they will usually be offered a choice of which skills they wish to use to attempt to overcome it. If they are successful, they will be given a metacognitive question to answer.

### Metacognitive Questions

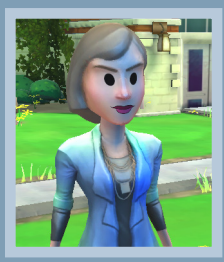
These questions are designed to test students' understanding of the concepts they have learned over the course of the game. Each one consists of a question and three possible answers. Answering correctly will grant students additional skill points in whichever skill they were using at the time.



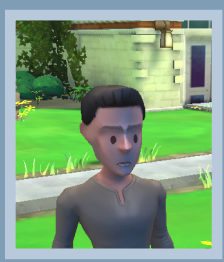
# THE CAST

**Hank:** The acutely observant school groundskeeper and janitor seems to know everything about McLarin Academy and everyone in it. If students have a question about the game world or the other characters, Hank likely has the answer.

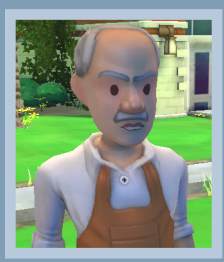
**Cosima:** The hyper-intelligent classmate and long-time friend of our students is also the perfect example of growth mindset. When the TALENT Machine brings upheaval to McLarin Academy, Cosima enlists the help of our students to organize a protest and prove once and for all that talent is just a minor player in lifelong education.



**Professor Spero:** The eccentric professor is an expert in neuroplasticity and mindset theory, ready to help our students learn the concepts to take down the misguided TALENT Machine.



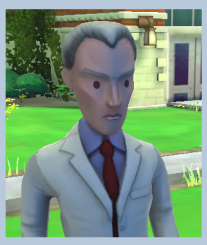
**Miguel Ruiz:** When the TALENT Machine determines that he is not destined for college, the young inventor accepts the results as truth and leaves campus, convinced he would only become a failure if he attempted to go to school for mechanical engineering. Certain their best friend is selling himself short, Cosima and our students concoct a plan to show Miguel that adopting a fixed mindset to avoid possible failure is not the way to achieve his dreams.



**Mr. Ruiz:** Miguel's father believes that through hard work and a growth mindset alone, one can achieve anything—no college necessary. So when his son returns home, prepared to never attend school again, Mr. Ruiz's fixed mindset about the value of a formal education overwhelms his logic, and our students must convince him that encouraging his son to return to school is in Miguel's best interest.

**Richard:** The self-involved elementary school friend of our students believes that he'll be able to coast through college and directly into his father's seat as CEO of his family's company. But when he finds that he can no longer rely on his natural talent to ensure he'll perform better than his peers, Richard no longer sees his self-worth and needs our students to help him through his identity crisis.

**Ms. Torres:** The jaded, long-time McLarin teacher has seen too many students fail out of school. To cope, Ms. Torres has adopted a fixed mindset and regularly encourages students to give up, rather than waste their time and money on higher education. She just needs someone to remind her that failure is not the end of learning.



**Dr. Myers:** Curious and inquisitive, the inventor of the TALENT Machine has a growth mindset but believes that he is the exception, not the rule; so when it comes to his machine, the scientist doesn't see anything wrong with his calculations. Our students must learn enough to show him where he went wrong and convince the scientist to forego fame in favor of truth.

**President Malloy:** The academy's president is a major supporter of the TALENT Machine program and hopes to put McLarin on the map for its inception. Like Ms. Torres, President Malloy believes student potential is fixed; and this leads him to see the machine as a boon to education, saving time and money on administrative fees and lowering dropout rates by eliminating the trial-and-error process most college students go through to find their majors. As both an avid supporter of the program as well as the financial backer, our students must gain enough information and support to finally convince the president that his idea of student potential is wrong and that the TALENT Machine will do more harm to his students than good.

# LEARNING EXTENSION ACTIVITIES

You can help students internalize and reinforce the key concepts from the game with some of the activities listed below:

## Classroom Discussion

Have a classroom discussion in which you tell students about a time you were challenged when attempting to learn something new and how you overcame that challenge. Consider the following example as inspiration: "Throughout most of my schooling, I struggled with math. In elementary school, I received poor grades in math, failed many tests, and had the hardest time understanding long division. I did so poorly that I thought of myself as 'not a math person.' From then on, I dreaded math classes. When I did have to take a math class, I put in as little effort as possible because I knew I wouldn't be successful. For all these reasons, I was really dreading the Algebra class that was required for all sophomores. At the beginning of the first day of class, my teacher told me that I may not be good at math, but I could work harder to get better. I decided to try harder. I spent 2 hours a day on my homework. I asked questions if I didn't understand. I asked my parents for help. I asked my classmates for feedback. I made flashcards to study. After my first test, I found that my hard work paid off. Come to find out, it wasn't that I am not a math person. Truth is, I just wasn't a math person . . . yet."

Highlight things like how hard it was, the strategies you used to overcome the challenge, and any help you gained from others.

Then, have students describe times where they have felt overly challenged by a problem. Discuss alternative ways to deal with those challenge or other ways to reach the same end goal.

Realizing that everyone faces challenges, even those who seem to find class easy, helps all students to realize that they have the potential to improve and that they shouldn't be afraid to ask for help.

## Write a Letter

Have students write a letter to another student detailing a struggle they had while attempting to learn something. Have them describe how it made them feel and what kinds of strategies or help they used to finally overcome the challenge.

Articulating the concepts in this way can help students to better internalize them, and it makes them evaluate their own mindsets.

## Neuroplasticity Project

Have students research and then produce a poster, diorama, PowerPoint, or other presentation on the concept of neuroplasticity that answers the following questions:

What is neuroplasticity and how does it work?

What are neurons and how do they change over time?

What are some strategies for making the brain grow and change?

What is a growth mindset and how does it relate to neuroplasticity?

## Mindset Project

Make a two-columned list, and then ask students about a time when they were challenged. As they tell you about how they responded to that challenge, have the class decide if they displayed a fixed or a growth mindset. If you'd rather not ask students, you can also give students scenarios and perform the same process.

This stresses that mindset is domain specific and that a person can have a growth mindset about one thing but a fixed mindset about another.

## Further Reading List

*Carol Dweck, Mindset: The New Technology of Success (2006)*
*Daniel Coyle, The Talent Code: Greatness isn't born. It's Grown. Here's how. (2009)*
*Malcolm Gladwell, Outliers: Stories of Success (2008)*

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