**ADVANCE**
**U**
— The Talent —
**MACHINE**

## *ADVANCE U: THE TALENT MACHINE* RESEARCH DOCUMENT

### Introduction

*Advance U: The TALENT Machine* is a game-based learning application for high school students about mindset theory and neuroplasticity. The game uses a creative narrative in a contemporary setting, which encourages students to learn about and practice these concepts. By participating in authentic conversations with game characters, students deepen their understanding of mindset theory and how the brain changes as they learn.

### Mindset and Neuroplasticity

A growth mindset is an individual's belief that their intelligence is not fixed, but malleable (Dweck, 2009). Both talent and mindset can determine an individual's ability to accomplish tasks and goals. Mindset becomes important when someone approaches the upper limits of their natural talent and begins to have difficulty completing tasks. When faced with a challenge that natural talent cannot overcome, an individual with a fixed mindset will hit a wall and give up, believing they lack the ability to overcome the obstacle. Someone with a growth mindset, however, will try new strategies to discover alternative means to solve the problem, seeing it as an opportunity to learn and expand their knowledge (Dweck & Yeager, 2019).

Non-cognitive ("soft") skills are personality traits and psychological constructs that are not reflected on general cognitive tests (Darling-Hammond et al., 2020). Traits such as persistence, resilience, academic buoyancy, goal setting, teamwork, time management, self-efficacy, self-regulation, and mindset are all non-cognitive skills that have been shown to promote academic achievement.

Neuroplasticity describes the ability of the brain to change over time. Learning something new causes the brain to make increased neural connections, and repeatedly studying or practicing a skill causes those connections to grow stronger. Robert Calfee identifies neuroplasticity as a key to educational advancement. Explicitly teaching students about neuroplasticity has been shown to dramatically increase student performance (Wilson & Conyers, 2020).

### Game-Based Learning

Game-Based Learning (GBL) has been shown to be an effective tool for increasing student engagement and motivation (Jabbar & Felicia, 2015). GBL provides an immersive learning environment that helps meet the needs of contemporary students (Anastasiadis et al., 2018). By providing clear goals, direct and immediate feedback, a balance between ability level and challenge, and a sense of control, GBL supports many of the components associated with student achievement.

GBL has been used effectively to teach STEM, non-cognitive, and life skills (Adame et al., 2017; Lee et al., 2016; McDonald, 2017). This indicates GBL is a useful tool that can be applied to various domains and objectives.

### Standards

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

• **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.

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• **Mindset**: Students will be able to explain the concept of mindset and identify their own mindsets and those of others.

• **Changing Mindset**: Students will be able to explain how they can change their own mindsets and help others to do the same.

## Gameplay

In *Advance U: The TALENT Machine*, the student explores mindset and neuroplasticity by conversing with a diverse cast of characters in an interactive story. Each character has their own distinct personality, problems, and mindset for the student to discover. As the story progresses, the student is given opportunities to apply what they have learned to help the characters change their mindsets and overcome the obstacles in their lives.

*Advance U: The TALENT Machine* allows the student to see how their words and actions can affect another person's mindset. The student then can compare their own mindset to those of the characters to better understand how they think. The game tests the student's understanding of the learning objectives through their application of information and their answers to metacognitive questions presented in their interactions throughout the game.

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