

Cultivating a Growth Mindset with Educational Technology

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In education, the goal is not only to supply students with skills and knowledge, but also to foster the ability to problem-solve and take on challenges, so that students are prepared to tackle issues they face outside of school. Decades of research have demonstrated that a student's mindset is a critical factor that impacts how comfortable and motivated they are when posed with a new or difficult problem to solve. Specifically, students who possess a growth mindset are more motivated to learn and take on more challenges compared to students with fixed mindsets (Blackwell, Trzesniewski, & Dweck, 2007). Given this research, many educators have been incorporating growth mindset strategies into their interactions with students in their classrooms for a number of years. Yet, despite the growing use of educational technology in the classroom, there has been little focus on the role of these tools in shaping a student's approach to learning. This paper explores what it means to have a growth mindset and how supporting this perspective in students can be enhanced in the context of educational technology.

What is a Growth Mindset vs. Fixed Mindset?

Dr. Carol Dweck, a professor at Stanford University, spent decades examining how students' own theories of intelligence reflect their behavioral and psychological response to academic challenges. Along with her colleagues, she found that a student's approach to a challenge is typically aligned with one of two outlooks on intelligence: it is fixed or it can change. In 2006, Dr. Dweck published a popular press book of her and her colleagues findings called *Mindset*. With over a million copies sold, the idea of a growth vs. fixed mindset has made its way into mainstream awareness.

Mindset theory suggests that students who possess a fixed mindset believe intelligence is stable and cannot change, while students with a growth mindset believe their intelligence can improve with work. Students who possess a fixed mindset are often preoccupied with the notion of high performance and will seek opportunities where they can prove their skills while avoiding situations where their weaknesses might be revealed. These students tend not to respond well

to failure because they believe their abilities are fixed and incapable of change—they feel they are either smart or not. On the other hand, students employing a growth mindset believe that their abilities develop over time. Students who take this approach tend to seek out opportunities to gain new knowledge, broaden their skills, and do not shy away from challenges. They view the brain as a muscle that can be exercised and strengthened (Ames, 1992; Kaplan & Maehr, 2007; Pintrich, 2000; Dweck, 1975, 1999, 2006).

What can be done in school to develop a growth mindset in students?

Research has demonstrated that praising a student's intelligence is not the best way to motivate learning. Students praised for intelligence over effort typically display less task persistence, less task enjoyment, and worse task performance on future tasks after a failure than students who were praised for effort in the same situation (Mueller & Dweck, 1998). Similarly, when teachers comfort students who are struggling by providing them less work or less challenging tasks, they may inadvertently demotivate those students to persist through future challenges (Rattan, Good, Dweck, 2012). Dweck (2010) also emphasized the importance of the role of the teacher to inspire and support, not to judge students. Rather than *deciding* who is smart and who is not, the role of the teacher in a growth mindset-focused classroom is to *collaborate* with students to grow everyone's knowledge.

Given the press that the topic of growth mindset has received, it's interesting to note that 85% of teachers who participated in a recent *Education Week* survey wanted more professional development related to this concept (Blad, 2016). One way to develop a growth mindset-centered classroom is to provide students with praise for effort and their learning process, rather than innate intelligence, and remind students that fast learning does not always equal deep learning, as some concepts take a long time to learn well (Dweck, 2010). However, Dweck herself notes that this strategy alone should not be solely equated with the idea of growth mindset (Briceno, 2015). Along with recognizing student efforts, teachers must support students in thinking differently and using new strategies to approach a problem in order to develop their skills. That is, it's not just about doing the same thing harder, but rather, about developing student's efficacy in trying new approaches (Yeager & Dweck, 2012).

Along these lines, another strategy is to highlight the plastic nature of brain development—the notion that the brain is capable of significant change—and that change is achieved by challenging oneself intellectually. In other words, learning challenges grow and change the brain, just as physical challenges grow and change your muscles. Students who learn they can change their brain through effort will learn that they have the skills to tackle challenges and overcome failures.

The work of developing growth mindset is not only about the students, but the systems that surround them. Proponents of growth mindset agree that supportive classrooms are ones in which students participate in decision-making, engage with tasks in ways that are personally meaningful and differentiated for their ability level, and work at their own pace while being evaluated in terms of progress, effort, strategy-use, and creativity (Ames, 1992; Epstein, 1989; Maehr & Midgley, 1991, 1996). Classwork and homework should not feel repetitive and unchallenging to students. Instead it should provide opportunities to face challenges, try variable strategies, and learn from failures (Dweck, 2010). Additional educational tools, such as digital learning tools, should also be structured in a manner to promote these elements of choice, personalization, and challenge.

Using Educational Technology to Foster a Growth Mindset in the Classroom

Given the importance of a student's mindset in response to challenges, and the increasing use of digital technology in the everyday classroom (Gray, Thomas & Lewis, 2010), what features of educational technology can be leveraged to foster the development of a growth mindset?

- **Choice over learning path and the opportunity to take learning risks**

Students with fixed mindsets may focus on the appearance of looking smart and avoiding failure over tackling challenges. Many educational technology tools allow a student to set their own pace, monitor their own progress, and choose their own activities (with no one looking) from a curated list of options at the right difficulty level, which may result in students taking greater risks in their learning and persisting more on challenging activities when they fail. For students who are still afraid to take risks, the data provided through educational technology tools to educators can help identify

students who may need extra support from the teacher to work on more challenging tasks. Students can also track how much work they have completed towards their goals and see what challenges lay ahead, as many educational technology tools display a student's path through the program.

- **Continuous feedback on ongoing effort**

Effective educational technology programs provide continual feedback to students through animations and progress monitoring indices, such as screens at the completion of a task acknowledging the student's effort or a counter that shows how many activities are completed and remaining in a unit. Allowing students to see how much time they spent on an activity and giving them immediate, real-time reinforcement after persisting through challenging work can support a growth mindset.

- **Denotation of progress through competencies gained**

Meaningful programs track a student's accumulated knowledge, beyond just providing a grade. Being able to log into a program at anytime to see a visual representation of all that one has learned can have a big impact in building competence, reinforcing that knowledge is gained through effort and that deep learning is something gained over time. The collected data can also be used as a discussion point between the student and the teacher to further support goal setting and progress monitoring.

- **Personalized material that challenges and engages students**

"Meaningful learning tasks need to challenge every student in some way. It is crucial that no student be able to coast to success time after time; this experience can create the fixed-mindset belief that you are smart only if you can succeed without effort (Dweck, 2010, n.p.)." A gradual release of responsibility model (Pearson & Gallagher, 1983) is commonly followed in classrooms where the teacher demonstrates a concept, the class and teacher practice the concept together, and then students try the work on their own. Educational technologies allow for different variations of this model, where students can first challenge themselves and demonstrate what they know (or do not know) about a concept. Ideally, children who have already mastered a concept can move onto more challenging material and students who have not yet mastered the concept can receive additional practice or direct instruction when needed, working through the material at

their own pace. Flipping the gradual release of responsibility model, which assumes all students start at the same level, allows students to work at their optimal challenge level. This ensures that no student continually coasts through the material and, of equal importance, that no student continually feels overwhelmed. Frequently, when students are using educational technologies, they do not even think of them as “school work” but rather as a “fun game”. This can go a long way in fostering a love of learning for the sake of learning, which also supports a growth mindset.

- **Continuous opportunities for individualized practice with mechanisms for teacher support**

As noted, an analogy commonly used when discussing growth mindsets is that of the brain being a muscle that needs exercise. If students do not lift heavy weights (i.e., face challenges) their brain cannot grow. Educational technologies not only allow students to face challenges scaffolded to their own skill level, many also provide opportunities to try different approaches or strategies to complete activities and allow students to learn from personalized, timely feedback. Further, many effective educational technologies have a way to alert teachers if a student is continuously struggling. At this junction, teachers can then work directly with students in a targeted fashion to help them consider alternative approaches to the concept where they are struggling and help them get “unstuck.”

- **Fostering supportive classrooms and school-to-home connections**

Finally, teachers and students need to work together to grow everyone’s knowledge and not compete over who is smarter (Dweck, 2010). Engaging educational technologies can be a way for students to talk about where they are, where they have been, and where they are going in the educational technology program. Students can celebrate each other’s successes, offer reassurances when there is a challenging task, or be peer mentors for one another. The data an educational technology tool provides can also be sent home with a student to inform a parent of how hard the student is working and remind the parent to support a growth perspective (e.g., “You worked so hard, look at how much you’ve accomplished in the past week”).

Summary and Conclusion

Part of the appeal of the concept of growth mindset is in its simplicity—the idea that we can either consider our own abilities as fixed or as able to change and grow. By thinking of the mind like any other muscle that we have the power to change, students learn new skills, gain strategies for overcoming challenges, and are motivated by their own knowledge-building. However, the reality of developing a growth mindset is that it requires a continuous process of learning where students are given ongoing opportunities to engage with challenges at optimal difficulty levels and receive support in using new strategies to approach them. Carol Dweck even notes that we all use a combination of growth and fixed mindsets depending on the work we are doing and the current situation (2014). As educational technology tools are integrated more ubiquitously in classrooms they can also be viewed as a way for teachers to continue to support the development of a growth mindset in their students. Many educational technology tools allow students to monitor their own progress, receive actionable feedback, and provide low-stakes opportunities for practicing different strategies for problem-solving. By considering the six points above when selecting an educational technology tool, educators can strive to support the development of growth mindsets in their students both online and off.

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