Asian Journal of the Scholarship of Teaching and Learning
2026, Vol. 16, No. 1, 38-47

Reflections on Practice

Cultivating a Growth Mindset in Higher Education: Implications for Module and Assessment Design

Ziqian ZHOU
Centre for English Language Communication, National University of Singapore

ABSTRACT

American psychologist Carol Dweck famously posited that one's intelligence or learning abilities are not fixed aspects of individuals; rather, these are highly malleable and can be developed through persistence, effort, amongst other things. Christening her foundational work as the 'growth mindset', Dweck's theory has profoundly influenced the field of educational psychology and shaped the development of educational policies within and outside the United States. While much of the research on the growth mindset has focused on K-12 education, its implications for higher education remain underexplored. In this reflection essay, I introduce the central tenets of Dweck's important work, describe its benefits, and show how these principles can be integrated into higher education module and assessment design. I also aim to discuss criticisms of Dweck's work that are found in the literature and sketch several ways of circumventing these difficulties.

Keywords: Growth mindset, Higher education, Module and assessment design, Tutor feedback and teaching practices

Correspondence: Ziqian Zhou (elczz@nus.edu.sg)

Recommended Citation:

Zhou, Z. (2026). Cultivating a Growth Mindset in Higher Education: Implications for Module and Assessment Design. *Asian Journal of the Scholarship of Teaching and Learning*, *16*(1). 38-47.

INTRODUCTION

Defining the Growth and Fixed Mindsets

Dweck's growth mindset theory posits that individuals who believe that their intelligence in general or learning abilities in particular can be developed through effort tend to outperform those who view their intelligence or learning abilities as fixed or static (Diener & Dweck, 1978; Dweck, 2006; Dweck, 2014).[1] Students with the growth mindset seek challenges, persist through setbacks or failures and view mistakes as opportunities to develop themselves (Dweck & Leggett, 1988; Moser et al., 2011; Ng, 2018); in contrast, those with the so-called 'fixed' mindset avoid challenges and perceive setbacks or failures as evidence of their own limitations (Dweck, 1986; Dweck & Leggett, 1988). Further, students with the growth mindset attribute setbacks or failures to a lack of personal effort or an ignorance of problem-solving strategies; relatedly, students with the fixed mindset, who view their intelligence or abilities as innately unchangeable, are less willing to persist through challenges, as they have experienced failure as a discouraging reminder of their limited abilities (Dweck, 1986; Dweck & Leggett, 1988; Elliott & Dweck, 1988). These behavioural patterns, as will be discussed later, have significant implications for academic performance and psychological resilience.

The foregoing general behavioural indications of the growth and fixed mindsets have been adopted by psychologists seeking to formulate more systematic tests that aim to identify the mindsets in question. A simple example of such a test is one where students possessing the growth mindset are those who self-report the cause of their failures or setbacks to be that of a lack of personal effort; in contrast, students possessing the fixed mindset are those who self-report the cause of their failures to be that of a lack of intelligence or ability (Diener & Dweck, 1978).[2] More complex or nuanced versions of such a test introduce scales that classify the degree to which an adult or adolescent can be said to possess growth mindset characteristics as well as fixed mindset ones (Rammstedt et al., 2022).

Benefits of a Growth Mindset in Higher Education

Research suggests that the growth mindset is associated with higher academic achievement in general, and greater resilience or persistence in meeting challenging tasks in particular (Schroder et al., 2017; Yeager & Dweck, 2012). Yeager and Dweck (2012) argue that students with the growth mindset are more likely to recover from academic setbacks. Interestingly, the authors also found that insofar as students with the growth mindset believe themselves to possess the potential for improvement, such students are less likely to experience the stress that typically results from peer pressure or peer victimisation (Yeager & Dweck, 2012). It has also been posited that students with the growth mindset are more likely to experience a smoother transition from high school to university or college, and to achieve higher grades, especially in STEM courses (Schroder et al., 2017; Yeager & Dweck, 2012).[3] These benefits highlight the importance of fostering the growth mindset in higher education because the self-learning skills just described are, arguably, instrumental in developing intellectual curiosity, which in turn drives students to learn about matters beyond their assigned curriculum.

Despite its widespread adoption, especially in K-12 education in the US, Dweck's growth mindset theory is not without its critics. One objection has it that the evidence for the benefits of the growth mindset strategies is insufficient because of small effect sizes (Macnamara & Burgoyne, 2023). Still others argue that the growth mindset theory ignores contextual factors such as the socioeconomic status of students (Bahník & Vranka, 2017; Li & Bates, 2020). One

response that can be made to the latter objection is to concede that while structural barriers such as a student's socioeconomic status may counteract the effects of the growth mindset, this does not show that the growth mindset is ineffective; rather, what the objection shows is that the growth mindset needs to operate alongside supportive learning environments especially for students facing certain structural barriers (Burnette et al., 2023). The criticism in question underscores, then, the need for more nuanced applications of growth mindset strategies in higher education, which the next section will seek to elaborate.

Strategies for Fostering a Growth Mindset in Higher Education

Dweck and various other advocates of the growth mindset have proposed numerous strategies for applying the theory. Although discussions of these strategies tend to be in the context of the K-12 education system in the US, what I seek to do in this section is to extend these strategies to aspects of university or college education. Cheng et al. (2021) have observed that 'one-off' lessons about the growth mindset in higher education have limited effectiveness—these interventions in the form of, say, standalone workshops or online modules directly about the growth mindset do not effect lasting behavioural change in students in tertiary settings. A similar claim is made by Sahagun et al. (2021), who argue that a 'growth-mindset pedagogy', which integrates growth mindset principles into course design, classroom practices, and assessment strategies, is more effective at fostering the growth mindset in college students than standalone direct interventions. I am sympathetic to the findings by Cheng et al. (2021) and Sahagun et al. (2021)—direct lessons about the growth mindset may appear contrived from the perspectives of more mature tertiary students. To look ahead, I intend to describe four areas where growth mindset strategies can be embedded into: module or course design, assessment design, instructor teaching practices and institutional support (the last of which aims to address an objection to the growth theory raised in the previous section).[4] It is hoped that the embedding of growth mindset strategies (as opposed to direct, standalone lessons about the growth mindset) will leave more long-lasting effects on students in higher education.

Module design. Module or course objectives, according to Dweck (1986), ought to aim at the development of skills over grades or rankings. The skills to be aimed at are, according to O'Rourke et al. (2014), those related to critical thinking. To be sure, much has been written about this widely used (and slippery) term that is 'critical thinking'. As I have argued elsewhere (Zhou, 2022), any given discipline or domain of inquiry would tend to have its own set of critical thinking skills, which are instrumental for achieving excellence in that discipline or domain of inquiry. As a result, to think critically in any given discipline or domain of inquiry is to exercise the knowledge and skills characteristic of achieving epistemic and practical success in that given field or practice. To appreciate the foregoing claim, consider the following description of skillsets taken from Nicholas and Raider-Roth (2016), which I summarised in table form below:

Table 1. Critical Thinking Skills

Discipline or Disciplinary Field	Philosophy	Humanities	Natural Sciences	Social Sciences
Questioning	Questioning	Problem solving	Problem solving	Questioning

Table 1. Critical Thinking Skills (*continued*).

Discipline or Disciplinary Field	Philosophy	Humanities	Natural Sciences	Social Sciences
Skills associated with the discipline or disciplinary field in question	Marking distinctions	Considering multiple perspectives	Decision making	Decision making
	Comprehend, articulate, analyse arguments	Occupying multiple frames of mind	Making reasonable assumptions	Testing hypothesis
		Qualifying or seeing differences	Synthesising of knowledge	
		Summarising	Testing hypothesis	

The table makes explicit the kinds of critical thinking skills that are associated with different disciplines or domains of inquiry. So, depending on the disciplinary nature of a course, tutors can foster the growth mindset by framing course objectives along the lines of the proposed skills.

However, discipline-specific critical thinking skills are not the only skills course designers can aim at: *generalised* critical thinking skills are just as important for two reasons. First, such skills anticipate the demands of courses that are increasingly trans- or interdisciplinary; second, and perhaps more urgently, the inception of artificial intelligence (AI) requires students to evaluate the reliability of information, develop their own authorial voice in research papers (Mhilli, 2023), amongst other critical thinking processes. It can, therefore, be recommended that the teaching of generalised critical thinking skills—ones that apply across different disciplines and can be used to analyse the output of AI—is another means of fostering the growth mindset. Hitchcock (1983) and Ennis (1996) have each proposed different frameworks for what constitutes critical thinking. A further framework embeds critical thinking with respect to problem-solving, which is a skill that has relevance to inter- and trans-disciplinary courses (Jenicek & Hitchcock, 2005):

1. Problem identification and analysis: the problem (the main question or the main point) is identified and, if necessary, broken up into component parts.
2. Clarification of meaning: the meaning of terms, phrases and sentences is clarified where necessary. This component includes clarification of the problem to see how it should be investigated, as well as operationalisation of key terms in an investigation.
3. Gathering the evidence: evidence relevant to the problem is obtained.
4. Assessing the evidence: the quality of the evidence is judged.
5. Inferring conclusions: conclusions are drawn from the best evidence, and inferences drawn by others are evaluated.
6. Other relevant information is considered: possible exception-making circumstances, situational factors, implications of one's tentative conclusions, alternative positions and their justification, alternative explanations of results, possible objections and criticisms, etc.
7. Overall judgment: some sort of overall judgment on the problem is reached after considering all the components of the critical thinking process.

A course that aims to foster the foregoing set of skills can organise the weekly syllabus in accordance with the order of the skills listed and draw liberally from examples across disciplines as well as from ordinary discourse that has hitherto been suffused with AI-generated materials.

With regards to module or course selection, it has been found that allowing students to choose topics or projects that align with their interests is a helpful means of fostering intrinsic motivation (Ng, 2018). When emphasis is placed on students' willingness to participate, their sense of ownership and control over the learning process increases, and this, in turn, encourages persistence through challenging tasks (McCombs & Miller, 2007), where such persistence is a hallmark of the growth mindset. In other words, practical steps to foster intrinsic motivation are also beneficial to the development of the growth mindset, which, in turn, spurs student persistence. Yet, there remains the worry that it is not always practicable to foster intrinsic motivation by allowing students control over their learning process or engendering an alignment of interests (e.g. a compulsory decision theory course for political science majors may be less interesting as compared to a course on political theory). A way to address this concern is to emphasise the fact that the various ways of fostering the growth mindset are complementary; in other words, with respect to less interesting courses, tutors or course designers can seek to dial up the other ways of developing the growth mindset, such as those which we will discuss shortly, namely, assessment design, feedback and tutor practices. Indeed, this recommendation is echoed by Limeri et al. (2020), who posit that the development of the growth mindset of students in higher education depends on an interplay of many factors in their educational environment as well as their interpretation of these factors.

***Assessment design*.** Formative or low-stakes assessments, according to Yeager and Dweck (2012), are effective means of providing feedback to students. The offering of feedback to students through formative (as opposed to summative) assessments, according to the authors, encourages iterative improvement on the part of students. Relatedly, formative or low-stakes assessments, it has been argued, reduce the fear of failure on the part of students (O'Rourke et al., 2014). The foregoing is also reinforced by a study by Limeri et al. (2020), who argue that, in a higher education setting, the growth mindset is fostered on the basis of multiple opportunities for revision and for learning from one's mistakes. Sahagun et al. (2021) argue that course assignments and grading policies ought to reward effort and progress. Indeed, in a study on the teaching of college algebra, Lewis et al. (2023) make the specific recommendation that the growth mindset can be developed by designing assessments that include multiple test attempts and that require test corrections—these, the authors argue, will lead to a reduction in failure rates and an increase in student persistence and success.

With regards to the kind of feedback that tutors ought to provide, Dweck and Yeager (2019) recommend feedback where the tutor points out to students whether or not certain assessment-relevant strategies have been used effectively; the authors also recommend that feedback from tutors should highlight or ascribe praise to student work that displays effort[5] and, where appropriate, progress from previous assessments (and, conversely, to avoid making mention of students' 'innate' or 'intrinsic' abilities). Further, it has been proposed by O'Rourke et al. (2014) that one effective means of fostering the growth mindset is for there to be assessments or classroom activities that prompt students to reflect on their learning processes and setbacks. In the higher education setting, Sahagun et al. (2021) recommend that instructors frequently emphasise the benefits of effort and the correct use of learning

strategies and frame mistakes as learning opportunities. According to Ng (2018), reflection by students on their setbacks makes for an effective opportunity for them to analyse mistakes with the aim of adopting better assessment-relevant strategies in future assignments (Ng, 2018). Finally, as a consequence of there being module objectives that aim at critical thinking skills, O'Rourke et al. (2014) also recommend that assessments—when aligned with module objectives—require that students solve problems, exercise critical thinking skills and demonstrate persistence through multiple revisions of coursework.

Instructor practices. It can be recommended that tutors or instructors themselves ought to model and reinforce growth mindset principles in their teaching. For instance, tutors can remark on how their persistence has been instrumental in their own research projects; the sharing of tutors' personal teaching or research struggles, and the strategies they have come to adopt are effective means of modelling the growth mindset principles for students. Further, the periodic reminder that students have autonomy in assignment topics fosters intrinsic motivation, which encourages persistence through challenging tasks (Ng, 2018). Limeri et al. (2020) further recommend that instructors frequently send their students the growth message that ability can be developed and that struggle is normal. To be sure, tutors and instructors are more able to deliver and model the growth mindset principles in their teaching if universities or colleges offer resources to faculty about such principles and explicitly express institutional endorsement of such principles. I will turn to this aspect in what follows.

Institutional support. Cheng et al. (2021) argue that the use of well-designed infographics is an effective medium to deliver messages related to the growth mindset to students in their actual learning environments. Further, Limeri et al. (2020) claim that the growth mindset is best developed in a collaborative environment rather than a hyper-competitive one; the authors further claim that when students see it as in their *own interest* to develop growth mindset principles, they are more likely to interpret failures or setbacks more positively. Finally, Sahagun et al. (2021) have proposed that the growth mindset can more easily take root in a tertiary setting where struggle is normalised and intellectual risk-taking encouraged. But, except for the foregoing studies, the extant literature has been largely silent on the types of support that institutions of higher learning can adopt to foster the growth mindset. Here, I will attempt to sketch some further proposals. As mentioned above, tutors and instructors are better able to model and apply growth mindset principles when universities and colleges provide faculty training on the topic. Such workshops, especially when paired with smaller peer mentoring sessions, reinforce the institution's commitment to fostering a growth mindset. At the same time, critics have noted that growth mindset initiatives must be supported by broader learning environments, particularly for students who face structural barriers (Burnette et al., 2023). A more nuanced approach in higher education situates students within their social context, recognising that their experiences are shaped by inequalities in authority and social roles—inequalities that stem from historical inequities (Haggis, 2009). In an interesting study conducted by Yan et al. (2021), it was found that growth mindset strategies are *not* culturally neutral; the authors, who analysed the PISA scores from over 500,000 15-year-old students across 75 countries or regions, found that the use of formative assessments in the Eastern context was linked to presence of the fixed mindset (unlike that of the growth mindset in the Western context). The explanation for this might be that Eastern students perceive formative assessments as yet another form of (summative) assessment where the stakes are high and where failure leads to undesirable consequences. The finding by Yan et al. (2021) holds an important lesson especially for non-Western institutions of higher learning: growth

mindset strategies have to be sensitive to the web of societal or cultural beliefs prevalent in a society; in the case of the use of formative assessments in Eastern societies, more can be done to separate such a form of assessment with grade-centric evaluative processes and, conversely, to associate it with the mastering of learning strategies or the opportunity for reflection.

The study by Yan et al. (2021) is a diamond in the ruff: it remains a largely unexplored topic what a more contextualised application of growth mindset strategies would look like. But it is certainly within the means of institutions of higher learning to promote longitudinal research on the uptake and stability of growth mindset principles in university or college students, especially after these students progress into their professional careers. Such studies, then, may shed light on the effectiveness of growth mindset principles in relation to socio-cultural characteristics or constructs such as race, gender and class.[6] Finally, given the importance of the growth mindset, it can be proposed that tertiary students, as a necessary component of their graduation, ought to take courses that aim at the development of the growth mindset. This can be put into practice by developing a set of courses in a university's general education curriculum (which most students are obligated to take) that bear the hallmarks of the growth mindset course and assessment design, if not of instructor practices as described above.

CONCLUSIONS

This article synthesises key findings on Carol Dweck's growth mindset theory and offers proposals for educators and university administrators. The growth mindset theory offers valuable insights for higher education in relation to the fourfold aspects of module design, assessment design, instructor practices and institutional support. By fostering a growth mindset, educators may enhance students' academic performance, resilience, and motivation. However, the application of growth mindset principles must be nuanced in a way that addresses criticisms and limitations through institutional research and student support systems. Future research can involve the exploration of the long-term impact of growth mindset interventions in higher education and their applicability across diverse student populations.

ENDNOTES

1. In Dweck's earlier work (Diener & Dweck, 1978), the growth mindset is christened as the 'mastery-oriented mindset'.
2. The use of self-report instruments is not without intellectual pedigree. For instance, the Intellectual Achievement Responsibility (IAR) Scale developed by Crandall et al. (1965) is an influential psychological assessment tool designed to measure the attributions of responsibility by individuals for their intellectual and academic successes and failures or 'effort attributions'. The use of self-report instruments is not without intellectual pedigree. For instance, the Intellectual Achievement Responsibility (IAR) Scale developed by Crandall et al. (1965) is an influential psychological assessment tool designed to measure the attributions of responsibility by individuals for their intellectual and academic successes and failures or 'effort attributions'.

3. The evidence for the foregoing claims is found mainly in Yeager and Dweck (2012). The paper is a review article that synthesises findings from numerous experimental studies; as a result, the methodologies described below are not from a single experiment. Fortunately, the following summary describes a methodology that is fairly representative of the experimental approaches discussed in Yeager and Dweck (2012); indeed, many of these experimental approaches were pioneered by Dweck, Yeager, and their colleagues. First, researchers use questionnaires to identify students' pre-existing mindsets. For instance, students rate their agreement with statements such as 'You have a certain amount of intelligence, and you really can't do much to change it' (for fixed mindset) and 'You can always greatly change how intelligent you are' (for growth mindset). Second, in order to establish the claim that the growth mindset leads to increased resilience, the following is conducted: (i) in a randomized control trial, students are randomly assigned either to an intervention group or a control group; (ii) the intervention group receives lessons on the growth mindset (for instance, a lesson on neuroplasticity—i.e. that neural connections are strengthened with challenges). The control group, in contrast, receives lessons that make no mention of neuroplasticity; (iii) the measurement of the outcome is done (again depending on the experiment in question) by tracking course completion, academic performance, tasks offered in laboratories, classroom behaviour, cortisol levels that are indicative of stress levels, etc. Steps (i)—(iii) constitute the multi-method approach that seeks to show a correlation between the growth mindset and greater resilience and achievement, and so forth
4. My selection of research material first begins with the locus classicus pieces of research by Dweck (and her colleagues). I then proceed to engage in the so-called 'snowball' sampling method—having picked out the locus classicus pieces by Dweck, I then choose from a sample of (where possible) widely-cited publications that draw primarily from or comment extensively on these locus classicus readings by Dweck. Finally, I organise the material in accordance with the fourfold distinction of module design, assessment design, instructor practices and institutional support, and offer conceptual summaries of these under each category.
5. For instance, a tutor might write 'Because you have persevered in your revisions, your overall argument is strengthened'.
6. Another study might offer a comparison between the growth mindset and a closely related notion of 'grit' due to Angela Duckworth (2007). See also Hochanadel and Finamore (2015), Barbouta et al. (2020) and Park et al. (2020).

ABOUT THE AUTHOR

ZHOU Ziqian, Jan is a Senior Lecturer at the Centre for English Language Communication, National University of Singapore. A philosopher by training, Jan publishes mainly in the domain of metaphysics. In the domain of education and the scholarship of teaching and learning, Jan has written on widely cited notions often traded in educational circles—those of empathy, student engagement, critical thinking and charisma. His teaching interest, however, is in the fields of ethics and philosophical aspects of the law (especially the criminal law). He considers teaching to be the most satisfying work he does.

REFERENCES

Bahník, Š., & Vranka, M. A. (2017). Growth mindset is not associated with scholastic aptitude in a large sample of university applicants. *Personality and Individual Differences, 117,* 139–143.

Barbouta, A., Barbouta, C., & Kotrotsiou, S. (2020). Growth mindset and grit: How do university students' mindsets and grit affect their academic achievement. International *Journal of Caring Sciences,* 13(1), 654–664.

Burnette, J. L., Knouse, L. E., Billingsley, J., Earl, S., Pollack, J. M., & Hoyt, C. L. (2023). A systematic review of growth mindset intervention implementation strategies. *Social and Personality Psychology Compass, 17*(2), Article e12723.

Crandall, V. C., Katkovsky, W., & Crandall, V. J. (1965). Children's beliefs in their own control of reinforcements in intellectual–academic achievement situations. *Child Development, 36*(1), 91–109.

Cheng, M. W. T., et al. (2021). A review of growth mindset intervention in higher education: The case for infographics in cultivating mindset behaviors. *Social Psychology of Education, 24*(5), 1335–1362.

Diener, C. I., & Dweck, C. S. (1978). An analysis of learned helplessness: Continuous changes in performance, strategy, and achievement cognitions following failure. *Journal of Personality and Social Psychology, 36*(5), 451–462.

Dweck, C. S. (2014). *Developing a growth mindset with Carol Dweck* [Video]. Stanford Alumni. https://www.youtube.com/watch?v=hiiEeMN7vbQ

Dweck, C. S. (2006). *Mindset: The new psychology of success.* Random House.

Dweck, C. S. (1986). *Motivational processes affecting learning.* American Psychologist, 41(10), 1040–1048.

Dweck, C. S., & Leggett, E. L. (1988). A social-cognitive approach to motivation and personality. *Psychological Review, 95*(2), 256–273.

Dweck, C. S., & Yeager, D. S. (2019). Mindsets: A view from two eras. *Perspectives on Psychological Science, 14*(3), 481–496.

Duckworth, A. L., Peterson, C., Matthews, M. D., & Kelly, D. R. (2007). Grit: Perseverance and passion for long-term goals. *Journal of Personality and Social Psychology, 92*(6), 1087–1101.

Elliott, E. S., & Dweck, C. S. (1988). Goals: An approach to motivation and achievement. *Journal of Personality and Social Psychology, 54*(1), 5–12.

Ennis, R. H. (1996). Critical thinking dispositions: *Their nature and assessability. Informal Logic, 18*(2–3), 165–182.

Haggis, T. (2009). What have we been thinking of? A critical overview of 40 years of student learning research in higher education. *Studies in Higher Education, 34*(4), 377–390.

Hitchcock, D. (1983). *Critical thinking: A guide to evaluating information.* Methuen.

Hochanadel, A., & Finamore, D. (2015). Fixed and growth mindset in education and how grit helps students persist in the face of adversity. *Journal of International Education Research, 11*(1), 47–50.

Jenicek, M., & Hitchcock, D. (2005). *Evidence-based practice: Logic and critical thinking in medicine.* AMA Press.

Lewis, H. M., et al. (2023). Using assessments to promote growth mindset in college algebra. *College Teaching,* 1–7.

Li, Y., & Bates, T. C. (2020). Testing the association of growth mindset and grades across a challenging transition: Is growth mindset associated with grades? *Intelligence,* 81, Article 101471.

Limeri, L. B., et al. (2020). Growing a growth mindset: Characterizing how and why undergraduate students' mindsets change. *International Journal of STEM Education, 7*(1), Article 35.

Macnamara, B. N., & Burgoyne, A. P. (2023). Do growth mindset interventions impact students' academic achievement? A systematic review and meta-analysis with recommendations for best practices. *Psychological Bulletin, 149*(3–4), 133–173.

McCombs, B. L., & Miller, L. (2007). *Learner-centered classroom practices and assessments: Maximizing student motivation, learning, and achievement.* Corwin Press.

Mhilli, O. (2023). Authorial voice in writing: A literature review. *Social Sciences & Humanities Open, 8,* Article 100438.

Moser, J. S., Schroder, H. S., Heeter, C., Moran, T. P., & Lee, Y.-H. (2011). Mind your errors: Evidence for a neural mechanism linking growth mindset to adaptive posterror adjustments. *Psychological Science, 22*(12), 1484–1489.

Ng, B. (2018). The neuroscience of growth mindset and intrinsic motivation. *Brain Sciences, 8*(2), Article 20.

Nicholas, M. C., & Raider-Roth, M. (2016). A hopeful pedagogy to critical thinking. *International Journal for the Scholarship of Teaching and Learning, 10*(2), Article 6.

O'Rourke, E., et al. (2014). Brain points: A growth mindset incentive structure boosts persistence in an educational game. In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems* (pp. 3339–3348).

Park, D., et al. (2020). The development of grit and growth mindset during adolescence. *Journal of Experimental Child Psychology, 198,* Article 104889.

Rammstedt, B. (2022). Measuring growth mindset: Validation of a three-item and a single-item scale in adolescents and adults. *European Journal of Psychological Assessment, 40*(1), 84–95.

Sahagun, M. A., et al. (2021). Developing a growth-mindset pedagogy for higher education and testing its efficacy. *Social Sciences & Humanities Open, 4*(1), Article 100190.

Schroder, H. S., et al. (2017). Neural evidence for enhanced attention to mistakes among school-aged children with a growth mindset. *Developmental Cognitive Neuroscience, 24,* 42–50.

Yan, Z., et al. (2021). Formative assessment, growth mindset, and achievement: Examining their relations in the East and the West. *Assessment in Education: Principles, Policy & Practice, 28(*5–6), 676–702.

Yeager, D. S., & Dweck, C. S. (2012). Mindsets that promote resilience: When students believe that personal characteristics can be developed. *Educational Psychologist, 47*(4), 302–314.

Zhou, Z. (2022). Critical thinking: Two theses from the ground up. *Journal of the Scholarship of Teaching and Learning. 22*(1), 154 – 171. ■