












## Growth mindset in competency-based medical education

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### ABSTRACT

The ongoing adoption of competency-based medical education (CBME) across health professions training draws focus to learner-centred educational design and the importance of fostering a growth mindset in learners, teachers, and educational programs. An emerging body of literature addresses the instructional practices and features of learning environments that foster the skills and strategies necessary for trainees to be partners in their own learning and progression to competence and to develop skills for lifelong learning. Aligned with this emerging area is an interest in Dweck's self theory and the concept of the growth mindset. The growth mindset is an implicit belief held by an individual that intelligence and abilities are changeable, rather than fixed and immutable. In this paper, we present an overview of the growth mindset and how it aligns with the goals of CBME. We describe the challenges associated with shifting away from the fixed mindset of most traditional medical education assumptions and practices and discuss potential solutions and strategies at the individual, relational, and systems levels. Finally, we present future directions for research to better understand the growth mindset in the context of CBME.

### KEYWORDS

Clinical: teaching and learning; clinical: work-based; management: role of teacher; learning outcomes: general; assessment: clinical

## Introduction

In the ongoing adoption of competency-based medical education (CBME) across health professions training (Carraccio et al. 2002), much has been written about assessment practices that support competency development (Frank et al. 2010; Holmboe et al. 2010; Harris et al. 2017; Lockyer et al. 2017; Iobst and Holmboe 2020). However, equal attention must be given to instructional practices and learning experiences that support individual development (Van Melle et al. 2019). As CBME calls for cumulative learning along a continuum of increasing medical sophistication (McGaghie et al. 1978), its successful implementation requires learners to be partners in shaping their own growth through individualized, ongoing learning with the lifelong goal of mastery.

An individual's approach to learning will significantly affect their success in a CBME program. Recently, there has been increasing interest in Dweck's self theory, or growth mindset, as an important underpinning value of health professions education (Teunissen and Bok 2013; Khalkhali 2018; Shapiro and Dembitzer 2019; Chadha 2020). Dweck reports that individuals have implicit views, or mindsets, regarding intelligence and abilities and whether they are fixed traits (fixed mindset) or changeable (growth mindset)

### Practice points

- A growth mindset, which entails the implicit belief that one can improve with focused effort, persistence, and coaching, aligns with the tenets of competency-based medical education.
- Health professions learners with a growth mindset are prepared to learn, adapt, and continually pursue mastery throughout their practice.
- The traditional culture of medical education is performance-oriented and risks promoting a fixed mindset in which trainees aim to appear competent and hide areas requiring further development.
- Framing the UME to GME transition from the perspective of a growth mindset would shift its focus from identifying the top applicants to identifying an individual's fit in a program that could best support their continued learning.
- To enact an institutional growth mindset in the system of health professions education, educators and education programs must apply and support concepts of growth toward mastery.

(Dweck 2016). Learners with the growth mindset recognize that the road to competence and onward to mastery is a developmental progression. However, the connection between the growth mindset and CBME has not been discussed in depth in the literature.

The purpose of this paper is to describe the synergy between the growth mindset and CBME and to address the challenges inherent in the adoption of the growth mindset. We also present practices and designs to foster the growth mindset across the medical education continuum.

### What is the growth mindset?

Mindsets have been described as a 'particular way of thinking' (*Merriam-Webster Online Dictionary*). They are a collection of attitudes, outlooks, and beliefs that powerfully shape personality and how one habitually thinks and acts. The foundation of a mindset is one's beliefs. For example, if a person believes they are intelligent then they are telling themselves, consciously and unconsciously, that they feel certain that they are intelligent. These adopted viewpoints profoundly affect how one responds to life events. Closely examining underlying beliefs will provide a clearer understanding of the cognitive processes linked to these underlying beliefs and thereby how they affect behaviours and the individual's self-interpretation, analysis, and labelling of those behaviours. In other words, our behaviours are the observable and measurable actions that reflect our beliefs. According to Dweck's mindset theory, these self-conceptions can profoundly 'affect what we want and whether we succeed in getting it' (Dweck and Leggett 1988; Dweck 2016). Dweck describes two main frames of mind by which life can be navigated: the growth mindset and the fixed mindset.

An individual with the growth mindset believes attributes (e.g. intelligence) are malleable and can be improved, while someone with the fixed mindset believes attributes are unchangeable and inherent to their self-worth (Hong et al. 1999; Dweck 2016). A learner's mindset can influence their goal orientation (Locke and Latham 2002), which is reflected in their behaviour. Fixed-mindset learners behave in a way that makes them 'look good' to reaffirm their self-worth and avoid failure, while growth-mindset learners focus on improving their competence in the pursuit of mastery and see failure as a part of the developmental process. The growth mindset promotes curiosity and a willingness to ask questions, while the fixed mindset subdues curiosity for fear of appearing incompetent. Learners with the growth mindset engage in extensive self-monitoring and base their satisfaction on effort exerted rather than simply on progress achieved. They seek input from external sources and welcome suggestions for improvement, while learners with the fixed mindset are more resistant to feedback or criticism. If faced with challenges, growth-minded individuals use setbacks to motivate themselves, increase their efforts, and use different strategies for learning. They demonstrate tenacity and persevere in response to adversity and failure. Learners with the fixed mindset react helplessly in the face of obstacles (Dweck 1975; Dweck and Leggett 1988; Klein et al. 2017; Osman et al. 2020). Having the growth mindset allows one to embrace the nonlinear

trajectory of learning and the inevitable failures as a part of the journey. It includes not giving up too soon but also realistically assessing the situation. The process of growth requires continual self-reflection, self-assessment, and self-acceptance of imperfections. Individuals with the growth mindset more accurately self-assess than those without the growth mindset and are more likely to view themselves as successful even after failure (Diener and Dweck 1980).

Learners with the fixed mindset worry that there is an endpoint to their ability. At any time, they feel they may reach their limit of intelligence, so they hide weaknesses. They see residency as a hurdle that may prevent them from reaching the level of unsupervised practice. Those with the growth mindset view their residency as the once-in-a-lifetime opportunity for supported learning and guided development required for unsupervised practice but certainly not the end point of their ongoing pursuit of excellence in practice.

### Growth mindset and CBME: connecting theory to practice

Growth mindset is a key ingredient to two constructs that are foundational in CBME: mastery learning and deliberate practice.

Mastery learning emphasizes the lifelong learning pathway that is essential for the practice of medicine in the twenty-first century, given the constant and rapid evolution of best practice. Planned, specific learning experiences are sequenced for developmental progression and/or to overcome weaknesses. The learner, informed by performance data and guided by a supervisor, is able to identify areas for improvement through careful reflection. Health care practitioners require these skills to continue to maintain competence for practice for the rest of their career (McGaghie 2015).

Ericsson's concept of 'deliberate practice' characterizes learning as a highly structured activity that is explicitly directed at improving performance in a particular domain. Rather than mindless repetition of a certain task, deliberate practice uses a focused approach to reach well-defined goals. Practical implementation includes (a) repetitive performance of intended cognitive or psychomotor skills, (b) rigorous observation of abilities by a more experienced individual, and (c) specific informative feedback, including suggestions for improvement (Ericsson 2015).

A CBME program founded on mastery learning and deliberate practice naturally situates the expectation for growth as central to learning. All students, residents, and practising physicians must continue to learn and improve. The progressive sequencing of learning explicates that all learners will experience a trajectory, although their relative strengths in different competencies and tasks will vary over time (Van Melle et al. 2019). The job of an educator is to work with learners to identify and monitor their progress and learning plans and reinforce the view that mastery is a process, not a single event that every learner experiences the same way. This learner-centred approach is analogous to patient-centred care wherein a physician tailors their care to a patient's preferences and medical condition(s).

A focus on the growth mindset in CBME should prompt the re-examination of some long-standing assumptions and

practices in health professions education. First, established views of excellence in medicine require reframing. Traditionally, excellence has been both defined and recognized by high grades indicating superior performance relative to peers. The emphasis on test scores to characterize excellence can devalue other equally important competencies for practice, including communication, relationships with patients and team members, professionalism, health systems skills, and lifelong learning (Razack et al. 2019). Excellence is traditionally viewed as an ability one naturally has or does not have (Sternberg 2001). The implicit message to trainees is that they must appear competent and should seek high grades while hiding weaknesses or questions (Pintrich et al. 2003; Bullock et al. 2019). In CBME, however, excellence is reframed as a dynamic set of traits and behaviours cultivated through deliberate practice with the support of a coach, thereby creating the opportunity for all learners to continually pursue excellence (Sternberg 2001; Ericsson 2015). Second, the traditional culture, which expects flawless performance rather than valuing improvement, is called into question. A growth-mindset focus aligns with and supports the necessary lifelong learning throughout any health care practitioner's career. Acceptance of the need for continual learning and improvement challenges the concept of remediation, which traditionally involves identifying and addressing deficiencies (Hauer et al. 2009). The focus on deficiencies and failure is at odds with the expectation for development and growth for all learners. Ellaway and colleagues acknowledge this tension by defining how 'remedial action' can be undertaken to strengthen support for a learner who is not progressing as expected, whereas formal 'remediation' signals the uncommon situation of serious concern about lack of progression and the potential for recommended removal from a program (Ellaway et al. 2018). That said, those with a growth mindset do not assume that everyone is capable of reaching the same level. Rather, they believe that everyone can improve. Destigmatizing remediation, coupled with efforts to identify individual learning needs as early as possible, can contribute to a culture in which improvement is valued (Chou et al. 2019). In a growth-oriented CBME program, all 'remedial action' should be reframed as a normal part of individuals' development, captured in their targeted learning plan, with the understanding that all learners will progress at different rates and have areas that need improvement. This is not to say that all learners must be given infinite time to demonstrate competence; rather, the term 'remediation' should be reserved for those specific instances where progress is not being made, despite targeted learning plans and support.

## Implications for implementing CBME with a growth mindset

### *Fostering growth mindset early in medical education*

Medical education would look entirely different if a growth mindset were a major part of the landscape. Currently, undergraduate medical education (UME) often reinforces the fixed-mindset practice of impression management, with learners keeping themselves wrapped in a 'cloak of competence' to hide performance deficits (Williams et al. 2003; McGaghie 2018) and achieve the highest possible grade

and ranking. If UME nurtured a growth mindset, grades would be de-emphasized to allow learners to focus on growth. Students might be liberated from the ever-present pull toward getting 'honours' in classes and on rotations, or from the emphasis on standardized test scores (Gesundheit 2019; Carmody and Rajasekaran 2020). Instead of worrying about normative comparisons with peers, students could focus on their improvement. Students with a growth mindset could embrace desirable difficulties, unafraid of others seeing them struggle (Bjork and Bjork 2015). For this to be possible, incentives that reinforce fixed mindsets must be removed. Moving to pass/fail rating systems and criterion-based standardized tests that minimize (or eliminate) normative comparisons may help students focus less on grades and more on growth (Lin et al. 2020).

### *Growth mindset in the transition from undergraduate to graduate medical education*

If UME moves toward a growth mindset, graduate medical education (GME) must act in sync. Currently, the transition process from UME to GME favours learners with the fixed mindset. Many GME program directors continually search for ways to find the 'best' applicants and predict who will succeed in residency, with little regard for growth potential (Green et al. 2009; Nallasamy et al. 2010; Makdisi et al. 2011; Weissbart et al. 2015). In fact, learner 'improvement' is viewed as undesirable in residency selection (Saudek et al. 2019). This reality may be driven by an aversion to recruiting learners who need significant help because of the substantial resources required to provide additional support. Encapsulating this challenge, Dupras and colleagues wrote, 'Ideally, resident performance problems could be minimized through a more stringent selection of applicants' (Dupras et al. 2012).

If all of GME were steeped in the growth mindset, resources could be shunted away from finding the 'best' applicants and toward efforts that help learners maximize their potential, such as longitudinal coaching programs or social-belonging interventions (Walton and Cohen 2011; Palamara et al. 2015). Imagine if UME programs embraced the growth mindset enough to be transparent and open about their graduates' strengths and weaknesses, and GME programs tried to match their program's strengths to each applicant's learning needs. Such a system would maximize a learner's long-term growth in the true spirit of CBME. The focus would shift from determining who is 'best' to establishing whether there is a good match between the needs and approaches of the program and the learning needs and goals of the learner.

### *Institutional growth mindset*

Institutional leaders and front-line faculty must first adopt and model the growth mindset before learners can be expected to embrace growth. Faculty members should reject the false notion that the goal of training is to produce perfect physicians at graduation and embrace the need to produce learners who are adept at continuous growth and learning. Normative assessment systems that reinforce comparison and competition should be minimized or removed. Institution-wide faculty development

should teach front-line educators to focus on processes and effort during coaching sessions rather than fixed attributes (Ricotta et al. 2019). 'Pimping,' a long-held method of reinforcing hierarchy and belittling learners through toxic quizzing, should be eliminated (Nagarur et al. 2019). This practice is the epitome of reducing someone's self-worth on the basis of performance and reinforces the fixed mindset.

Perhaps most challenging, the stakes of failure in health professions training must be reduced. Medical students in many countries, with the United States and United Kingdom as two examples, incur large amounts of financial debt (Ercolani et al. 2015; AAMC 2020), making failure untenable. Compounding this, compassionate off-ramps from physician training do not always exist (Bellini et al. 2019). Making physician training competency based and more time variable, as is already happening in some countries, might alleviate some of the pressure that learners and programs feel (Lucey et al. 2018). Rather than reinforcing an arbitrary time-based finish line where some learners may be labelled with 'competence not realized,' the growth mindset affords learners the time they need to gain mastery, changing the label to 'competence not yet realized.'

### Strategies for adopting the growth mindset in CBME

Despite the natural synergy between CBME and the growth mindset, adopting this approach across the continuum is challenging at the individual, relational, and systems levels.

For individual learners, the challenge is to overcome a tendency toward the fixed mindset reinforced by years of rote memorization and standardized assessment practices (Shapiro and Dembitzer 2019). Simply introducing learners to the rationale and practices for adopting the growth mindset can be effective (Klein et al. 2017). Implementing a learner-initiated, individualized learning plan and process can also reinforce desired behaviours (Ramani et al. 2019).

Individual faculty members need to recognize that their language can profoundly affect their behaviour and the behaviour of those around them (Kegan and Lahey 2001). The words that they use indicate the mindset they hold (Ricotta et al. 2019). For example, instead of saying 'You're a good communicator' (emphasizes fixed attribute), a growth-oriented coach might say 'I imagine that you've worked hard to develop your communication skills. You communicate well with patients and other team members.' Peer-to-peer observation is a strategy to encourage growth-mindset behaviour among faculty (Shapiro and Dembitzer 2019). When faculty embrace observation and feedback in this way, as well as other behaviours consistent with the growth mindset, such as the pursuit of daily life-long learning, they encourage their learners to engage in the same behaviours. Individual misperceptions must also be addressed. For example, some faculty think that the growth mindset applies primarily to the cognitive domain (e.g. clinical reasoning) as opposed to the affective domain (e.g. empathy and compassion) (Pal et al. 2020). It is important to ensure that both faculty and learners understand that competencies in the affective domain can be developed, although not necessarily through direct teaching but through careful cultivation of social interactions (Ekman

and Krasner 2017; Lavelle et al. 2017). Additionally, when faculty examine their beliefs and practices with respect to their own continuous learning and improvement they can gain significant insight into their interactions with their learners. Role modelling continuous learning and having explicit conversations about a growth-mindset approach to errors or challenging situations will have an impact on the learning environment and even encourage these behaviours. Furthermore, if faculty make learners aware of their commitment to the learners' development it will support the establishment of an educational partnership and signify a safe learning environment (Eva et al. 2012; Telio et al. 2016).

At the relational level, the growth mindset can be conceptualized on the interpersonal level in the social context of learning (Osman et al. 2020). For example, purposeful feedback and coaching is central to the effective implementation of CBME. Meaningful external perspective supports progressive growth in learning through the identification of individualized learning goals (Dweck 2016). Clearly, the quality of the data matters. For example, rich narrative descriptions of learner performance are foundational to effective feedback (McConnell et al. 2016). To ensure quality feedback and coaching, however, teacher-learner relationships must use these data to promote deeper reflection and learner self-efficacy and to create an educational alliance (Ramani et al. 2019). Bidirectional relationships that foster co-regulated learning are critical to the ongoing development of learning in practice (Wearne 2016; Ajjawi and Regehr 2019; Rich et al. 2020).

At the systems level, it is within our processes of assessment and promotion that the growth mindset can either be cultivated or crushed. CBME encourages the dual-purposing of assessment, which sets up a tension between the use of assessment *for learning* and *of learning* (Lockyer et al. 2017; Watling and Ginsburg 2019). Understandably, if we create assessment systems that focus only on demonstrating competence, we will discourage growth-mindset behaviours. Learners will be tempted to perform for their supervisors rather than to seek honest feedback about areas for improvement (LaDonna et al. 2017). Equally important, our systems of assessment must reward our teachers in ways that encourage growth. Clinical teachers who provide regular observation and coaching for improvement to learners need to be appropriately acknowledged. Incentives to provide and record high-quality narrative suggestions and steps for improvement to learners will also encourage such growth-oriented behaviour, at least early on when a culture of improvement is being established. Use of the entire spectrum of scales to reflect the trajectory of learning is critical and needs to be the expectation. As stated by Watling and Ginsburg (2019), 'a learning culture focused on assessment may limit learners' sense of safety to explore, to experiment, and sometimes to fail.' If trainees must simply acquire a certain number of assessments that demonstrate their competence, what incentive do they have to seek out assessment in moments of vulnerability to get feedback so they can improve? If assessments that highlight deficiencies or room for improvement 'don't count' or, even worse, contribute negatively to progression decisions, then trainees will seek assessment only at moments of strength. Electronic

dashboards, which merely bean-count assessments, will further encourage performance orientation, the fixed mindset, and the gaming of assessment systems. Early signals of such trainee assessment-seeking behaviours and gaming of assessment systems have been noted in CBME (Acai et al. 2019; Weller et al. 2020). Our response needs to be mindful adoption of programmatic assessment, from both the learner and teacher perspective, which aims to encourage the growth mindset.

Additionally, at the systems level, organizational values and leadership profoundly influence the organizational/institutional culture and thereby what behaviour is encouraged. Hence, the existence of these constructive goal-setting relationships is highly dependent upon the existing organizational culture and values (Watling et al. 2014; Ramani et al. 2017). The culture in our systems of education and health care needs to support and encourage activity and behaviours that reflect the growth mindset. For example, an organization that approaches an error as an opportunity for quality improvement rather than with the goal of assigning blame would be promoting a growth culture. Leadership support is critical to the adoption of the growth mindset, and using a multipronged approach that connects theory to organizational practice is an ideal strategy (Derler et al. 2018, Halvorson et al. 2017). Establishing a positive learning climate is also critical for fostering growth-oriented feedback practices (Ramani et al. 2017). Adopting a new organizational culture is a challenging task, with few organizations using the required comprehensive approach (Derler et al. 2018, Halvorson et al. 2017).

### A call for research on growth mindset in CBME

Our understanding of the growth mindset in the context of medical education is still in its infancy. No doubt there are many questions worthy of exploration, reinforcing a recent commentary suggesting that care must be taken to go beyond face value when considering the growth mindset (Effron 2020). For example, the extent to which, and exactly how, a shift from the fixed to the growth mindset can be influenced has yet to be examined. Although it has been suggested that a faculty member's beliefs and actions can nurture mindsets in medical education positively or negatively (Ricotta et al. 2019), this connection has not been validated empirically. In fact, recent research suggests that faculty members can hold both the fixed and the growth mindset when they teach certain attributes (e.g. empathy vs. clinical reasoning) (Pal et al. 2020). Consequently, the circumstances in which teachers adopt a particular mindset also need to be explored. Is the growth mindset a threshold concept in the sense that once made explicit, a new perspective opens up leading to a transformed way of understanding and acting (Meyer et al. 2009), or are learners at risk for reverting to the fixed mindset? Answering these questions will be key to fully realizing the benefits of CBME.

### Conclusion

We have argued for a natural synergy between the growth mindset, where abilities are viewed as being open to development, and the adoption of CBME, where the emphasis is

on working toward mastery. That traditional approaches to medical education tend to reinforce a fixed mindset, where 'looking good' is an overriding concern, is a particular challenge when introducing the growth mindset. The growth mindset must be inculcated at the individual, interpersonal, and systems levels and across the medical education continuum. However, considerable research is still needed to ensure that the theoretical promise of the growth mindset is appropriately translated into practice in CBME.

### Disclosure statement

No potential conflict of interest was reported by the author(s).

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