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Exploring the characteristics and context that allow Master Adaptive Learners to thrive

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ABSTRACT

Because change is ubiquitous in healthcare, clinicians must constantly make adaptations to their practice to provide the highest quality care to patients. In a previous article, Cutrer et al. described a metacognitive approach to learning based on self-regulation, which facilitates the development of the Master Adaptive Learner (MAL). The MAL process helps individuals to cultivate and demonstrate adaptive expertise, allowing them to investigate new concepts (learn) and create new solutions (innovate). An individual's ability to learn in this manner is driven by several internal characteristics and is also impacted by numerous aspects of their context. In this article, the authors examine the important internal and contextual factors that can impede or foster Master Adaptive Learning.

Introduction

Providing high-quality care to patients requires healthcare teams to correctly identify existing problems, select and implement appropriate therapies, and apply effective preventive measures to address future health issues (Regehr and Mylopoulos 2008). When confronted with common known patient problems, physicians typically employ previously used solutions rather than developing *de novo* solutions. When presented with novel challenges, prior solutions may not work. Instead, clinicians are required to re-orient prior knowledge to the new problem; incorporate new learning to address the problem, and innovate a new solution. The expertise literature contrasts these scenarios by differentiating routine and adaptive expertise (Schwartz et al. 2005; Mylopoulos and Regehr 2011; Carbonell et al. 2014; Mylopoulos and Woods 2017; Hatano et al. 1986). Routine expertise applies existing effective and efficient solutions to problems, while adaptive expertise is needed to learn or innovate new solutions when novel challenges are encountered.

Practicing physicians must demonstrate these complementary aspects of expertise to provide high-quality care. Calls to focus on adaptive expertise development in medical education are increasing (Mylopoulos and Woods 2017; Mylopoulos et al. 2018). To produce a model for physician learning which facilitates the development of adaptive expertise, Cutrer et al. (2016) described a metacognitive approach to lifelong learning based on self-regulation. The theory-based model creates a shared mental model and language for learners and educators to facilitate deeper learning and the development of adaptive expertise. Previously described core phases and skills of the MAL model are briefly reviewed below. This article expands and develops the model by focusing on characteristics within

Practice points

- The Master Adaptive Learner model provides a shared mental model for learners and educators.
- Medical education should target adaptive expertise development.
- Curiosity, motivation, mindset, and resilience impact the ability to learn and develop adaptive expertise.
- Coaching can make learning more effective.
- Learning environment factors can impede or foster learning adaptive expertise development.

the learner, and contextual factors that can foster or impede deep learning and the development of adaptive expertise.

Master Adaptive Learner model overview

The Master Adaptive Learner model (Cutrer et al. 2016) combines stages of physician learning (Moore 2007) with the cycle of self-regulated learning (SRL) theory (White and Gruppen 2010) into an integrated learning model that parallels the Plan-Do-Study-Act cycle of quality improvement (Taylor et al. 2014). Four key phases are required for effective learning (see Figure 1). In the *Planning* phase, the learner first identifies a gap in his own knowledge, skills, or attitudes. Gap identification can come as a moment of surprise (Schön 1983) or via deliberate data analysis. For students, performance data can include test results, clinical performance assessments, or feedback from clinical supervisors. For residents and practicing physicians, outcomes

Figure 1. Characteristics and contexts that allow the Master Adaptive Learner process. Adapted with permission from Cutrer et al. (2016).

from individual or panels of patients can highlight gaps. Following gap identification, learners select an opportunity for learning and search for resources. The *Learning* phase incorporates critical appraisal of resources and effective learning strategies, such as spaced repetitious learning (Kerfoot et al. 2011), self-testing (Karpicke and Blunt 2011),

and concept mapping (Pinto and Zeitz 1997). The *Assessing* phase combines informed self-assessment (Sargeant et al. 2010; Sargeant et al. 2011) with external feedback. Learners in this phase evaluate whether they have gained understanding and the ability to apply new learning. In the *Adjusting* phase, learners incorporate new

learning into changing practice. Unfortunately, studies consistently show that practicing physicians struggle to change their clinical practice based on learning encounters (Regehr and Mylopoulos 2008). To combat this, learners must develop skills around implementation (i.e. change management) and clarity regarding application of the new understanding.

Importantly, these steps do not function in isolation. To more deeply understand the function of the MAL process, the internal learner characteristics and contextual factors must be further explored.

Personal characteristics

Four internal characteristics foster the MAL process – curiosity, motivation, mindset, and resilience which promote and sustain the learner's ability to engage in the learning cycle.

Curiosity

Fitzgerald (1999) described curiosity as the “urge to investigate, to discover.” Curiosity is the internal desire of the learner to know and understand more. It drives the learner to enter the learning cycle rather than leave questions unanswered. Learners who demonstrate curiosity are “less likely to accept what they are told uncritically, enjoy asking questions, and are more willing to reveal their questions and uncertainties in public” (Deakin Crick 2007). Educators and researchers have postulated that curiosity triggers learning, playing a critical role in intellectual discovery, problem-solving, empathic responses, self-monitoring, and lifelong learning (Fitzgerald 1999; Sternszus et al. 2017).

Intellectual curiosity comprises two aspects, an inherent, stable baseline trait curiosity and a variable, context-dependent state curiosity (Sternszus et al. 2017). Richards et al. (2013) have shown that medical students with high levels of trait curiosity tend to utilize “deep” learning strategies that promote understanding rather than “surface” learning strategies that rely on memorization. Sternszus et al. (2017) expressed concern that common practices in the medical educational experience may inadvertently suppress curiosity, especially state curiosity. However, this can be mitigated: a literature review by Dyche and Epstein (2011) concluded that curiosity and related habits of mind can be supported through “specific, evidence-based instructional approaches.”

Motivation

Without motivation, learners will not spend the time or energy necessary to enter in and complete the learning cycle. Multiple theories from educational psychology explore learner motivation and are applicable to medical education (Kusurkar et al. 2012). The Self-Determination Theory (SDT) of motivation, for example, distinguishes between intrinsic and extrinsic motivations (Ryan and Deci 2000). Studies have shown that intrinsic motivation is associated with deep learning, enhanced academic performance, continuation of studies, and well-being (Kusurkar et al. 2011; ten Cate et al. 2011; Kusurkar et al. 2011).

While motivation is clearly an independent variable in promoting learning, it can also be impacted. The learning environment (LE) can play an important role in enhancing motivation (Kusurkar et al. 2011). Curricula that are specifically designed to stimulate internal motivation in students can powerfully influence the outcomes produced by the LE.

Mindset

Mindset has been defined as a belief pattern held about one's own intelligence and capacity for learning. Dweck (1986, 2006) differentiates between self-theories and their impact on learning as the “fixed mindset” and “growth mindset.” Individuals with fixed mindsets believe that basic qualities, such as intelligence or talents, are fixed traits. They tend to believe that talent alone creates success – without much effort – and are therefore hesitant to take on challenges for fear of embarrassment or failure. In contrast, individuals with growth mindsets believe they can develop their abilities through dedication and hard work. Individuals with growth mindsets embrace challenges, accept critical feedback, and invest in learning.

Research shows that students' mindsets can change through targeted interventions resulting in enhancements in their academic performance (Blackwell et al. 2007). Evidence also demonstrates that helping medical students adopt a growth mindset is a more effective route to their academic success than attempting to alter their learning styles (Feeley and Biggerstaff 2015).

Resilience

Resilience is the “the process of adapting well in the face of adversity, trauma, tragedy, threats or even significant sources of threat” (American Psychological Association 2010). It is the ability to endure and grow stronger in the face of challenges and failures. Duckworth et al. (2007) have described a similar construct, which they call grit. Resilience is a complex multidimensional construct, which varies widely among individuals. An individual's response to stress depends on numerous genetic, developmental, cognitive, psychological, and neurobiological risk and protective factors (Southwick and Charney 2012).

Studies have identified resilience as a central element of medical student and physician well-being (Dunn et al. 2008; Dyrbye et al. 2010; Zwack and Schweitzer 2013), especially in clinical learning environments (Delany et al. 2015). Resilience gives learners the ability to persist and continue in the learning process, even when it becomes challenging and stressful.

Resilient learners cultivate specific skills, habits, and attitudes that enhance their capacity to have a healthy response to stress, achieving goals with minimal psychological and physical costs. This includes the capacity for self-awareness, mindfulness, self-monitoring, limit setting, and engaging in a constructive way to challenges at work (Epstein and Krasner 2013). It also entails establishing practices such as cultivating relationships with family and friends, continuous professional development, physical exercise, spiritual nurturance, and ultimately knowing and accepting one's professional and personal boundaries

(Zwack and Schweitzer 2013). Thus, resilience can be enhanced through education and practice. In the clinical setting, this could include creating protected times for personal reflection or appreciation of patient successes.

In addition to these internal characteristics, external considerations also impact the learner's ability to thrive in the MAL process.

Coaching

Because of its critical role in making learning more effective, coaching serves as the rheostat in the MAL model. Adaptive expertise creates a "clear burden" on learners (Mylopoulos and Regehr 2009), raising the question – how do students explicitly understand what is required to become a MAL? Coaching can have an important influence on each of the four stages in the MAL model.

Deiorio et al. (2016) note, "An academic coach is a person assigned to facilitate learners achieving their fullest potential ... by evaluating performance via review of objective assessments, assisting the learner to identify needs and create a plan to achieve these, and helping the learner to be accountable. Coaches help learners improve their self-monitoring, while modeling the idea that coaching will likely benefit them throughout their career."

Coaching can underscore the importance of a long-term, trusted relationship in the feedback process. The educational alliance aligns nicely with the coaching model, as it "... reframes the feedback process from one of information transmission to one of negotiation and dialogue occurring within an authentic and committed educational relationship that involves seeking shared understanding of performance and standards, negotiating agreement on action plans, working together toward reaching the goals, and co-creating opportunities to use feedback in practice" (Telio et al. 2015). This alliance can optimize each phase of the MAL cycle.

Planning phase: By stimulating reflection on gap identification, prompting the learner to set goals, and by continually bringing the conversation back to identified goals, coaching can positively influence the *Planning* phase. With learners new to goal-setting, coaches can ensure that the goals are reasonable by using a framework such as I-SMART and providing feedback on the quality of the goals (Lockspeiser et al. 2013). Coaches can also offer accountability in goal attainment.

Learning phase: Coaches can model the idea that learning should be a lifelong habit, including not just factual knowledge, but all domains of physician performance. Coaches may offer valuable personal anecdotes about their own experiences of needing to learn something new. Additionally, coaches may offer credibility in recommending resources or may suggest more appropriate learning strategies.

Assessing phase: Physicians' skills in self-assessment are generally flawed (Davis et al. 2006). The coaching relationship offers the potential to develop improved self-assessment by encouraging habitual reflection on available data, with coaches serving as objective trusted interpreters of assessment data. This process is often aided by learner portfolios (van der Vleuten et al. 2012; Spickard et al. 2016). As with learning, coaches can also positively frame

that receiving assessment data in practice is a valuable adjunct to their own feedback seeking behavior (Crommelinck and Anseel 2013).

Adjusting phase: The *Adjusting phase* can be difficult, especially for junior learners who may feel little control over their environment. Coaches can serve as credible sounding boards for ideas as they may bring experiences of working within those same health systems, and offer an overview of the mechanisms by which quality of care and patient safety is improved.

Thus, with its ability to influence all four stages in the MAL cycle, coaching offers a positive contextual factor through the coach-learner educational alliance. The final major consideration regarding the external context for the MAL process is the LE.

Learning environment

The learning environment, a critical background influence, can be either positive, fostering more effective learning, or negative, impeding effective learning. The LE represents a complex construct that suffers from ambiguous definition and manifestations that vary from one setting to another. Most authors concur that the LE is fundamentally psychosocial in nature because it centers around educational interactions and outcomes. It is useful to think of the LE from different levels of social systems (Gruppen and Stansfield 2016). At the foundational level is the individual learner, whose learning history, characteristics and skills all influence one's interaction with a given LE. Next in the hierarchy are groups or teams of individuals who are working and learning together. Organizations (e.g. a medical school, a health system, etc.) include multiple groups within a larger entity that has policies, culture, priorities, and resources that constitute another aspect of the LE, which may differ based on locale (Skochelak et al. 2016). Local communities and societies provide even broader contexts for the expression of LEs.

At the interface of the learner and the environment, we can examine two ways the MAL and the LE interact. Focusing on an individual learner, we can consider how the MAL model helps one adapt to or cope with a possible adverse or challenging LE. The components of the MAL process may have an inoculating or protective effect. Some of this protective effect may arise from the internal characteristics that "energize" the MAL process: curiosity, motivation, mindset, and resilience. Each of these promotes perseverance in the face of difficulties and persistence in a potentially difficult or negative environment.

The MAL process, itself, aids in adaptation in various ways. Skills acquired to support the *Planning* phase will enable the MAL to identify knowledge and skill gaps that are relevant to the environment as well as to frame goals that are viable in that environment. Similarly, skills in the *Learning* phase can be used to help identify learning resources and strategies that are better fits to the constraints of a particular LE. The form and the amount of feedback available in the environment may have a major impact on the assessment phase of the MAL. Consider the contrasting impact on a medical student surrounded by faculty who consistently receive and review their own performance data and residents who are consistently provided

with feedback from faculty members, in contrast to faculty physicians who practice in isolation and residents who report never receiving any feedback to guide their own development. The *Assessing* phase will feel far more natural and impactful for the learner in the former LE. Similarly, the *Adjusting* phase may take different forms, depending on the environment. A MAL who is strong in each of these phases should be better prepared to analyze, adapt, and learn, in spite of the adverse features within a given LE.

Focusing on the LE, we can identify a variety of interventions or modifications of the LE that could support and nurture the development of the MAL. Coaching programs, for instance, can introduce, develop, and nurture MAL skills in learners ensuring that the MAL model serves as a shared language for adaptive expertise development. Similar support and encouragement can come from well-designed student academic support services, particularly those that target the *Learning* phase of the MAL. It may be feasible to design the LE for developing MAL skills through early, explicit guidance with demonstrations and practice of the MAL process. This supportive scaffolding could be gradually withdrawn to promote more independent, self-initiated SRL cycles.

Transitions between various LEs have been identified as challenges for learners (Dunham et al. 2017). These transitions may be from classroom to clinic, from medical school to residency, from one rotation to another, but all are opportunities for developing programs to ease the transition in ways that support learning. The precise details of such interventions must reflect the learners, learning goals, and curriculum. However, key components could include coaches, resources for independent learning, systems for feedback provision in safe settings that acknowledge gaps, and teams and social networks that facilitate implementation, such as learning communities (Smith et al. 2016).

Conclusions

To provide high-quality healthcare, physicians need to continue to learn throughout their careers and develop and demonstrate both routine and adaptive expertise. The MAL model provides a shared mental model and common language to facilitate deeper learning that will help move toward adaptive expertise development. It is critical to consider internal characteristics such as curiosity, mindset, motivation and resilience and their impact on a learner's ability to progress through the MAL process. External contexts, such as the availability of a coach and attributes of the LE, also have the power to impede or foster the learning and development of adaptive expertise. Consideration of these internal dynamics and external contexts provides insight into the function of the MAL model and how to help learners thrive.

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Disclosure statement

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Glossary

Master Adaptive Learner: Individual who utilizes the meta-cognitive approach to self-regulated learning that leads to adaptive expertise development.

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