

Title:

Sustainable Engaged Accountable Learners

Authors:

Michael A. Gisondi, MD¹, Jeremy Branzetti, MD², Laura R. Hopson, MD³, Linda Regan, MD, MEd⁴

Michael A. Gisondi, MD¹

Associate Professor and Vice Chair of Education

Principal, The Precision Education and Assessment Research Lab

Department of Emergency Medicine

Stanford University

Jeremy Branzetti, MD²

Assistant Professor and Residency Program Director

Ronald O. Perelman Department of Emergency Medicine

New York University

Laura R. Hopson, MD³

Associate Professor and Associate Chair for Education

Department of Emergency Medicine

University of Michigan

Linda Regan, MD, MEd⁴

Associate Professor and Vice Chair of Education

Department of Emergency Medicine

Johns Hopkins Medical Institutes

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Mailing Address for Corresponding Author:

Michael A. Gisondi, MD
900 Welch Road – Suite 350
Stanford Emergency Medicine
Palo Alto, CA, USA 94304
1-773-960-1733
mgisondi@stanford.edu

Mailing Addresses for Other Authors:

Jeremy Branzetti, MD
NYU Department of Emergency Medicine
462 First Ave, Office A340A
New York, NY, USA 10016
1-516-455-9232
Jeremy.branzetti@nyulangone.edu

Laura R. Hopson, MD
UM Department of Emergency Medicine
1500 E. Medical Center Dr., TC B1 380 / 0305
Ann Arbor, MI, USA 48109-5305
1-734-645-5435
lhopson@med.umich.edu

Linda Regan, MD, MEd
JHU Department of Emergency Medicine
1830 East Monument Street, Suite 6-100

Baltimore, MD, USA 21287

1-917-776-8473

lregan@jhmi.edu

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DR. MICHAEL A. GISONDI (Orcid ID : 0000-0002-6800-3932)

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Sustainable Engaged Accountable Learners

Abstract

The development of lifelong learners is among the most challenging goals for medical educators. The authors identify two important scholarly works that profoundly altered their understanding and approach to lifelong learning and curriculum design: L. Dee Fink's *Taxonomy of Significant Learning* and Cutrer et al.'s *Master Adaptive Learner* model. By applying these guides to their teaching and related research, three important characteristics of lifelong learning became evident: sustainability, engagement, and accountability. These are abbreviated, 'SEALs', for *Sustainable Engaged Accountable Learners*. This paper defines these qualities as they relate to emergency medicine training, significant learning, and the development of adaptive expertise. Connections to Fink's and Cutrer's works are offered for each learner characteristic. Educational and psychological theories that support the SEALs model are paired with practical suggestions for educators to promote these desired qualities in their trainees. Relevant features of adult learning are highlighted, including self-regulation, motivation, agency, and autonomy.

Introduction

The development of a lifelong learner prepared for the evolving landscape of clinical practice is among the fundamental charges and challenges of medical educators.¹ Our authorship team derived a new conceptual model of lifelong learning,

32 inspired by two important educational resources that influence our teaching and
33 research on this topic: L. Dee Fink's *Taxonomy of Significant Learning* and the *Master*
34 *Adaptive Learner* model for skill acquisition by Cutrer et al.^{2,3} Taken together, these
35 resources offer a roadmap for educators to develop emergency physicians who may
36 demonstrate ideal learning skills across the continuum of their careers.

37 The *Taxonomy of Significant Learning* is a course design framework that
38 facilitates meaningful learning and results in enduring and transformative changes in
39 student thinking, feeling, or behavior.^{2,4} The *Taxonomy* describes six domains of
40 learning that must be addressed by teachers for significant student learning to occur:
41 Foundational Knowledge, Application, Integration, Human Dimension, Caring, and
42 Learning to Learn. Fink's *Taxonomy* informs curriculum decisions that promote
43 significant learning by considering all six domains in the design of every course.

44 The *Master Adaptive Learner* model describes four interconnected phases of
45 learning used by all master learners: planning, learning, assessing, and adjusting. This
46 model aims to develop adaptive expertise as a central skill in medical trainees.³
47 Adaptive experts apply their foundational knowledge to commonly seen cases, and they
48 integrate past experiences and training to solve uncommon or rare problems. For
49 example, emergency physicians apply their knowledge of cardiology when caring for
50 patients with common presentations of atrial fibrillation. In contrast, they integrate their
51 knowledge of electrophysiology and past experiences treating arrhythmias when they
52 encounter their first case of Brugada Syndrome, an uncommon condition. Adaptive
53 expertise, the effective use of knowledge to address common and uncommon problems,
54 is the ultimate goal of emergency medicine training.

55 We believe three ideal characteristics of lifelong learners can be distilled from the
56 *Taxonomy of Significant Learning* and the *Master Adaptive Learner* model:
57 sustainability, engagement, and accountability. We propose a new conceptual model of
58 expertise in lifelong learning that summarizes these ideal characteristics, SEALs:
59 *Sustainable Engaged Accountable Learners*.^{5,6} (Figure.) The model serves to highlight
60 these key characteristics of expert learners, who are well-prepared, disciplined,

61 autonomous, and highly successful in a wide variety of environments, including those
62 unfamiliar and requiring adaptability. Physician trainees can be taught to be lifelong
63 learners who attain similar adaptive expertise if we intentionally optimize their
64 educational experiences and learning opportunities.

65

66 **Sustainable Learners**

67 Sustainability is a complex term with multiple definitions in higher education. In
68 the sciences, sustainability most commonly refers to the longevity and health of
69 ecosystems and the environment.⁷ For medical education, we define sustainable
70 learners as physicians who are expert, lifelong learners. Sustainability is therefore an
71 essential characteristic of trainees who have fully internalized the need for lifelong
72 learning and commit to developing necessary learning skills. Being a “learner” becomes
73 part of one’s professional identity and an inherent element of the student’s nature.
74 Sustainable learners recognize that they will be constantly challenged with new learning
75 goals and must adapt their practice to remain competent and current.⁸

76 Sustainable learners understand learning to be a never-ending process that
77 liberates them from a singular focus on discrete learning endpoints, such as tests or
78 course grades. Instead, learning becomes a moral and societal imperative linked to their
79 mandate as a medical professional. This transition is fraught with challenges. Fink’s
80 *Taxonomy* offers an important roadmap for medical educators to assist students’
81 understandings of ‘Caring’ and ‘Human Dimension’, highlighting these emotional drivers
82 of learning in medicine.^{2,9} For example, Sockalingam et al. found that psychiatry
83 residents shared motivations to be lifelong learners due to their emotional desires to
84 deliver high-quality care and their professional responsibilities to society; however,
85 these residents believed they lacked skills for effective lifelong learning.^{10,11} Training
86 recommendations from this study included purposeful role modeling and deliberate
87 teaching of lifelong learning techniques in the residency curriculum.^{10,11} Other practical
88 ways to incorporate Fink’s ‘Caring’ dimension in a residency curriculum include the use
89 of empathy measures to reduce physician burnout, the design of ‘most memorable’

90 case conferences, and the application of the Stanford University Wellness Framework
91 to lifelong learning skills training.¹¹⁻¹⁴

92 The *Master Adaptive Learner* framework similarly describes the requisite
93 metacognitive skills necessary to plan, assess, and adjust learning, each required for
94 sustainability as adult learners.^{3,15} Knowledge translation shifts, evidence-based
95 medicine follow-up case conferences, reflective practices, and trainee portfolios have
96 been used to teach lifelong learning principles to emergency medicine residents.¹⁶⁻¹⁹
97 For emergency physicians in practice, an obvious example of sustaining medical
98 knowledge is participation in the American Board of Emergency Medicine Lifelong
99 Learning Self-Assessment for maintenance of board certification.²⁰

100

101 **Engaged Learners**

102 Engagement emerged as a goal of teaching and learning when Houle
103 investigated the reasons that individuals self-direct their learning.²¹ Knowles later
104 theorized that adults are 'self-directed', 'active' learners who engage with learning
105 resources based on need, meaning, and context.^{22,23} Engaged learners exercise
106 agency that reflects their personal epistemology and ability "to plan and manage their
107 own learning."²⁴ To facilitate student engagement, teachers use a wide variety of
108 instructional methods, technological enhancements within the learning environment,
109 and novel pedagogical approaches.²⁵ Such efforts to engage learners have clear
110 benefits, including higher academic achievement and perceptions by students and
111 faculty that advanced levels of learning are attained.²⁶

112 The *Master Adaptive Learner* framework is predicated on the principles of
113 reflection and critical thinking, two processes that require active engagement in learning
114 and the development of foundational knowledge.³ A cycle of self-regulated learning,
115 self-assessment, and adjustment underpins all lifelong learning skills and practices.
116 Self-assessment scales have been used successfully to enhance active learning and
117 critical thinking.²⁷ Larsen et al. used a highly-engaging 'weekly learning goals'

118 intervention in a neurology clerkship to teach self-regulated learning skills, which
119 concurrently improved foundational knowledge and reinforced principles of lifelong
120 learning.²⁸ Wolff et al described the importance of ‘informed self-assessment’ to
121 promote lifelong learning, which considers the influence of internal performance drivers
122 such as learner engagement, emotion, confidence, and motivation.²⁹

123 Fink echoes the importance of reflection and critical thinking, but also specifically
124 addresses learner engagement in his ‘Learning How to Learn’ and ‘Human Dimension’
125 domains. The text, *Learning Medicine* by Wei and Chamesian, is a treatise on medical
126 student engagement in learning science and a rich source of student-derived curriculum
127 design ideas that promote lifelong learning.³⁰ Richards et al identified additional factors
128 that determined how students learn to effectively use study materials, reaffirming the
129 importance of learner engagement.²⁴ Clinician educators may simply choose to anchor
130 all learning activities in Fink’s ‘Human Dimension’ domain – it is a defining element of
131 our profession, with a mandate for emotional intelligence, self-regulation, and focus on
132 the value of profound relationships to others.² These are critical components in any
133 meaningful learning experience in medicine.^{3,9} Examples of educational interventions
134 that promote self-regulation and positive interprofessional relationships include “Best
135 and Worst Days” case discussions, use of Skeff’s ‘Chronology of the Present Illness’
136 framework, and autonomy supportive changes to the learning climate.^{10,31-32}

137

138 **Accountable Learners**

139 Accountability reflects actions or behaviors that respond to individual or group
140 needs, resulting from duty, obligation, or values. Johnson and Johnson’s social
141 interdependence theory states, “outcomes for individuals are affected by their own and
142 others’ actions” and serve as the motivational basis for collaborative learning.^{33,34}
143 Numerous modifications of the learning environment demonstrate that accountability
144 can be learned, promoted, and enhanced. For example, individual accountability is
145 thought to be inversely related to the size of a collaborative learning team.^{34,35}
146 Optimization of feedback processes between individuals improves social accountability

147 within groups of learners, and promotes goal-setting and feedback-seeking behaviors
148 by individuals learners.³⁶ In a study of nursing students, learners were more
149 accountable to one another when they perceived belongingness and partnership,
150 empowerment, trust, and a balance between clinical and educational requirements.³⁷

151 Professions are defined by accountability. Accountable physicians effectively
152 translate positive behaviors developed through collaborative learning to their daily
153 practice of medicine. They practice accountability -- to patients, society, and their own
154 needs through lifelong learning. Adaptive learners develop accountability through steps
155 in the *Master Adaptive Learner* framework that highlight the iterative cycle of learning,
156 especially actions related to assessment and adjustments of learning. Critical to these
157 steps is the fundamental acknowledgment by the learner that they alone bear the
158 responsibility to maintain their knowledge and skills.³ Educators may use reflective
159 writing activities with trainees to explore society's trust in physicians; this trust is based
160 on expectations of professionalism, deep foundational knowledge, and accountability.³⁸
161 Residents demonstrate accountability when using methods of performance-driven gap
162 identification and community-driven gap identification to plan their learning.¹⁵

163 Clinician educators using *Fink's Taxonomy* can reinforce the development of
164 accountable, professional behaviors through the deliberate design of collaborative
165 training experiences and cooperative learning environments. A focus on students
166 making connections with each other, their patients, and their emotions -- key elements
167 of Fink's 'Human Dimension' and 'Caring' domains -- help educators reinforce
168 accountability within a curriculum.² Moreover, student accountability to future patients
169 includes the development of deep 'Foundational Knowledge,' considered by some to be
170 a moral imperative.³⁹ Finally, improving physician accountability may be less about
171 discreet curricular activities and, instead, better characterized as the most critical
172 learning outcome of medical training; without accountability, the profession fails.⁴⁰

173

174 **Summary**

175 SEALs, *Sustainable Engaged Accountable Learners*, is a model to conceptualize
176 attributes of ideal learners in emergency medicine, inspired by Fink's *Taxonomy of*
177 *Significant Learning* and Cutrer's *Master Adaptive Learner* framework. SEALs are expert
178 learners who demonstrate an actionable understanding of the key concepts of
179 sustainability, engagement, and accountability. These highly valuable qualities may be
180 developed in emergency physicians through the design of educational experiences that
181 promote significant learning and the development of adaptive expertise.

182

183

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