



## Adult Learning Theories and their Influence on Medical Education and Anesthesiology

Lauren Emery Smith, MD, MPH; Thomas J. Caruso, MD, MEd, Stanford University

Over the last 200 years, evolutions in learning theories have influenced modern medical education and impacted the training of anesthesiologists. The Socratic Method, a form of cooperative, argumentative dialogue based on asking and answering questions to prompt critical thinking, has long been the primary teaching modality used in medical education.<sup>1</sup> Socratic teaching is interlaced with the apprenticeship model; as medicine differentiated into various specialties, the apprenticeship model adopted Socratic teaching to augment experiential, bedside teaching.<sup>1</sup> The apprenticeship model and Socratic Method are grounded in the pedagogical dogma that promotes hierarchical education, with the teacher as the knowledge source and the students as dependent learners motivated by external influences.

Modern day anesthesiology training has evolved over many years into our current system, greatly influenced by the evolution of learning theories. In recent years, the Socratic Method has come under scrutiny; Socratic teaching often degrades into poorly crafted, “guess what I am thinking” questions that are rife with harsh, hidden judgment with deleterious

effects on the learning environment.<sup>1</sup> Born out of the study of pedagogy, andragogy emerged in the late 20<sup>th</sup> century. Andragogy, the theory of adult learning, was shaped by Malcolm Knowles’ foundational principles that adult learning should be experiential, problem-centered, with clear relevance to the learners’ goals, and inclusive of the learner in the evaluation of their instruction.<sup>1</sup> Andragogy aims to redefine the “teacher-student” power dynamic by positioning the expert teacher parallel to the student and content, facilitating learners’ development of more complex, critical ways of thinking that resemble expert problem solving.<sup>1</sup> Andragogic theory calls for the evolution of the Socratic Method toward purposeful questions slightly above the learner’s current ability to help define performance gaps, provide areas of improvement, and spark self-reflective inquiry.<sup>1</sup> In the late 20<sup>th</sup> century, andragogic learning theories redefined medical student and anesthesia curricular development (Table 1). As medical knowledge continues to expand and technological advances are integrated into adult learning environments, adult learning theories will continue to reshape anesthesiology training.

Table 1: Summary of adult learning theories

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| <p><b>Theory of the Margin:</b> Adulthood is a balance between demands on life (load), available resources (power), and the margin between them. Successful adult learners are able to increase their power in the face of increasing load to maintain their margin. As medical schools continue to move toward more distance curricula online, it has allowed students to modulate the load imposed by medical school depending on their other commitments.</p>   | <p><b>Proficiency Theory:</b> Assuming that adult learning is developmental and transactional, given the opportunity, adults can become proficient using knowledge, skills, and abilities. In 2014, the ACGME initiated the Next Accreditation System (NAS), which used educational milestones to assess trainees’ outcomes; NAS assessed knowledge, skills, and abilities in multiple domains to determine proficiency.</p>  |
| <p><b>Experiential:</b> David Kolb’s theory of experiential learning aims to combine experience, perception, cognition, and behavior into learning environments. Learning may begin at any of the following stages, but usually follow in sequence: (1) concrete, active experience (2) conscious reflective observation on experiences (3) abstract conceptualizing of theory/model to observation (4) active experimentation to test theory/model. Medical schools and anesthesia residency programs have employed immersive technologies to enhance the learning and simulate rare experiences to allow learners to engage and experiment without patient risk.</p> | <p><b>Transformational:</b> This theory posits that adult education changes consciousness through psychological understanding of self, revision of convictions, and changes in behavior. Learning in adulthood is transformational, rather than simply learning new knowledge. Understanding of past perspective and the ability to look at new structures and perspectives are key to the transformative learning theory. In anesthesia practice, supplying residents with contrasting articles on a topic, and asking them their thoughts and insights on the different elements of each article helps them question their own understanding and move through the process of learning to inform their practice.</p> |
| <p><b>Collaborativism:</b> This theory focuses on leveraging learning networks and the augmentation of human agency and knowledge through technology. For example, medical students use online learning platforms and discussion forums during preclinical years to facilitate asynchronous peer-to-peer engagement.</p>   | <p><b>Connectivism:</b> Learning occurs within and outside of an individual as specialized sets of information are connected to each other to result in knowledge acquisition. For example, it has become commonplace to use Twitter to disseminate information among various academic groups, and during academic conferences.</p>   |

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