

Selected Readings on Teaching
Stanford Faculty Development Center for Medical Teachers

October 2018

I. Related to Categories in the Stanford Faculty Development Center's Educational Framework

- Learning Climate
- Control of Session
- Communication of Goals
- Promotion of Understanding and Retention
- Evaluation
- Feedback
- Promotion of Self-Directed Learning

II. On Additional Topics

- Gender
- Learning Theory
- Millennials
- Multitasking

III. Other resources

Stanford Teaching Commons – initiative of the Office of the Vice Provost for Teaching and Learning
<https://teachingcommons.stanford.edu>

Active learning:

Faust JL, Paulson DR. Active learning for the college classroom. J Excel Coll Teach 1998;9(2):3-24.
<http://www.calstatela.edu/dept/chem/chem2/Active/index.htm>

Freeman S, Eddy SL, McDonough M, Smith MK, Okoroafor N, Jordt H, Wenderoth MP. Active learning increases student performance in science, engineering, and mathematics. PNAS 2014;111(23):8410-8415. <https://www.ncbi.nlm.nih.gov/pubmed/24821756>

Process oriented Group Inquiry Learning <http://POGIL.org>

I. Related to Categories in the Stanford Faculty Development Center's Educational Framework

Learning Climate

Bradbury NA. Attention span during lectures: 8 seconds, 10 minutes, or more? *Adv Physiol Educ* 2016; 40(4):509-513.

In the current climate of curriculum reform, the traditional lecture has come under fire for its perceived lack of effectiveness. Indeed, several institutions have reduced their lectures to 15 min in length based upon the “common knowledge” and “consensus” that there is a decline in students’ attention 10-15 min into lectures. A review of the literature on this topic reveals many discussions referring to prior studies but scant few primary investigations. Alarming, the most often cited source for a rapid decline in student attention during a lecture barely discusses student attention at all. Of the studies that do attempt to measure attention, many suffer from methodological flaws and subjectivity in data collection. Thus, the available primary data do not support the concept of a 10- to 15-min attention limit. Interestingly, the most consistent finding from a literature review is that the greatest variability in student attention arises from differences between teachers and not from the teaching format itself. Certainly, even the most interesting material can be presented in a dull and dry fashion, and it is the job of the instructor to enhance their teaching skills to provide not only rich content but also a satisfying lecture experience for the students.
<https://www.ncbi.nlm.nih.gov/pubmed/28145268>

Bunce DM, Flens EA, Neiles KY. How long can students pay attention in class? A study of student attention decline using clickers. *J Chem Ed* 2010;87(12):1438-1443.

Students enrolled in three levels of general chemistry self-reported their attention decline during both lecture and other teaching approaches via personal response devices (clickers). Students report attention declines of 1 min or less more often than longer attention lapses. The data suggest that student engagement alternates between attention and nonattention in shorter and shorter cycles as lecture proceeds. Introduction of other pedagogies, specifically, clicker questions and demonstrations resulted in significantly lower self-reported student attention decline than lecture. This effect persisted during lectures immediately following the intervening pedagogies. Implications of this research for teaching are discussed. <http://dx.doi.org/10.1021/ed100409p>

Kost A, Chen F. Socrates was not a pimp: Changing the paradigm of questioning in medical education. *Acad Med* 2015;90(1):20-24.

The slang term “pimping” is widely recognized by learners and educators in the clinical learning environment as the act of more senior members of the medical team publicly asking questions of more junior members. Although questioning as a pedagogical practice has many benefits, pimping, as described in the literature, evokes negative emotions in learners and leads to an environment that is not conducive to adult learning. Medical educators may employ pimping as a pedagogic technique because of beliefs that it is a Socratic teaching method. Although problems with pimping have previously been identified, no alternative techniques for questioning in the clinical environment were suggested. The authors posit that using the term “pimping” to describe questioning in medical education is harmful and unprofessional, and they propose clearly defining pimping as “questioning with the intent to shame or humiliate the learner to maintain the power hierarchy in medical education.” Explicitly separating pimping from the larger practice of questioning allows the authors to make three recommendations for improving questioning practices. First, educators should examine the purpose of each question they pose to learners. Second, they should apply historic and modern interpretations of Socratic teaching methods that promote critical thinking skills. Finally, they should consider adult learning theories to make concrete changes to their questioning practices. These changes can result in questioning that is more learner centered, aids in the acquisition of knowledge and skills, performs helpful formative and summative assessments of the learner, and improves community in the clinical learning environment. <http://www.ncbi.nlm.nih.gov/pubmed/25099239>

McCarthy CP, McEvoy JW. Pimping as a practice in medical education—Reply. *Jama* 2016;315(20):2236-2237. Opinion piece. <http://www.ncbi.nlm.nih.gov/pubmed/27218642>

Stoddard HA, O’Dell DV. Would Socrates have actually used the “Socratic method” for clinical teaching? *J Gen Intern Med* 2016;31(9):1092-1096.

Medical students and residents are familiar with clinical teaching methods in which a faculty member poses a series of questions to them. This technique is often called the “Socratic method,” but it is frequently perceived by learners as an attempt to demean them, a practice that is colloquially known as “pimping.” The distinction between Socratic teaching and pimping lies in the perception of “psychological safety.” Psychological safety allows learners to answer questions or ask for help without threats to their dignity or worthiness. In a psychologically safe clinical teaching context, learners recognize that questions posed by attending physicians probe their current understanding and guide them to expand their knowledge. In pimping, questions are posed to embarrass the learner and to reinforce

the teacher's position of power over them. Absent a threat of disparagement or condemnation, learners are able to focus on building schema for knowledge, skills, and attitudes, rather than worrying about shielding their self-worth. This article presents the proper Socratic method, as intended by Socrates, and contrasts it with pimping. This perspective defines psychological safety as the pivotal factor distinguishing Socratic teaching from pimping, and establishes the foundation for empirical studies of these common practices in medical education.

<https://www.ncbi.nlm.nih.gov/pubmed/27130623>

Vaughn LM, Baker RC. Psychological size and distance: Emphasising the interpersonal relationship as a pathway to optimal teaching and learning conditions. *Med Educ* 2004;38(10):1053-1060.

BACKGROUND: Positive interpersonal relationships between teachers and learners increase the quality of learning. The purpose of this study was to investigate psychological size (perceived status) and psychological distance (perceived emotional connectedness) in medical teaching interactions and their impact on the teaching and learning process. **METHOD:** A total of 45 paediatric preceptor/resident pairs engaged in longitudinal continuity training experiences at different sites were surveyed about teaching effectiveness, satisfaction with teaching, and the psychological size and distance in the relationship between each pair. **RESULTS:** Both residents and preceptors perceived the resident as having a smaller psychological size compared to the preceptor. Residents perceived greater psychological distance in the relationship than did preceptors, and this distance was significantly related to both residents' satisfaction with particular preceptors and their perception of the preceptors' effectiveness.

CONCLUSIONS: Psychological size and distance contribute to effective and satisfactory teaching. Investigating additional aspects of the teaching-learning relationship should help identify optimal educational conditions.

<http://www.ncbi.nlm.nih.gov/pubmed/15461650>

Control of Session

Chou SY. Millennials in the workplace: A conceptual analysis of millennials' leadership and followership styles. *IJHRS* 2012;2(2):71-83.

The Millennial Generation in the workplace has received increasing attention as it has been shown that Millennials demonstrate different attitudes, values, beliefs, and aspirations in the workplace compared to the previous generations. Although a number of studies have devoted to the investigation of Millennials, the leadership and followership styles exhibited by Millennials at work has been largely neglected. Thus, the major purpose of this article is to develop a conceptual framework that explores Millennials' leadership and followership styles in the workplace. By examining Millennials in the context of leadership and followership, this article provides important theoretical and practical implications. <http://dx.doi.org/10.5296/ijhrs.v2i2.1568>

Kissane-Lee NA, Yule S, Pozner CN, Smink DS.. Attending surgeons' leadership style in the operating room: Comparing junior residents' experiences and preferences. *J Surg Educ* 2016;73(1):40-44.

PURPOSE: Recent studies have focused on surgeons' nontechnical skills in the operating room (OR), especially leadership. In an attempt to identify trainee preferences, we explored junior residents' opinions about the OR leadership style of teaching faculty. **METHODS:** Overall, 20 interns and 20 mid-level residents completed a previously validated survey on the style of leadership they encountered, the style they preferred to receive, and the style they personally employed in the OR. In all, 4 styles were explored; authoritative: leader makes decisions and communicates them firmly; explanatory: leader makes decisions promptly, but explains them fully; consultative: leader consults with trainees when important decisions are made, and delegative: leader puts the problem before the group and makes decisions by majority opinion. Comparisons were completed using chi-square analysis. **RESULTS:** Junior resident preference for leadership style of attending surgeons in the OR differed from what they encountered. Overall, 62% of residents encountered an authoritative leadership style; however, only 9% preferred this ($p < 0.001$). Instead, residents preferred explanatory (53%) or consultative styles (41%). Preferences differed by postgraduate year. Although 40% of interns preferred a consultative style, 50% of mid-level residents preferred explanatory leadership. **CONCLUSIONS:** Junior resident preference of leadership style in the OR differs from what they actually encounter. This has the potential to create unwanted tension and may erode team performance. Awareness of this difference provides an opportunity for an educational intervention directed at both attendings and trainees.

<https://www.ncbi.nlm.nih.gov/pubmed/26422000>

Communication of Goals

Sklar DP. Competencies, milestones, and entrustable professional activities: What they are, what they could be. *Acad Med* 2015;90(4):395-397.

Sklar (editor) describes a typical session of a clinical competency committee assessing residents and considers problems with the process that trouble him. He provides definitions for the terms competency, competent/competence, milestone, and entrustable professional activity (EPA) which he feels are key in the "foundational language of competency-based assessment." Discussion follows of the concepts of expertise and the

continuum of performance and how these relate to assessing students. He introduces four articles in this issue of *Academic Medicine* (Vol. 90, #4, 2015) that address assessment (Chen et al., Caverzagie et al., Williams et al., commentary by Holmboe) and uses them as a basis, along with his own understanding, to make four recommendations to improve assessment. First, training programs, certifying, and licensing organizations need to develop a consensus on the meaning of competence for independent clinical practice. Second, there is a need for more faculty development in the area of assessment. Third, assessment requires time and committed relationships between learners and faculty. Fourth, assessment of trainees must include assessment of their training environment. He believes the key concept to consider is ten Cate's point that "Educators do not fully exploit these gut feelings about trustworthiness for assessment purposes." Sklar concludes that competency-based assessment "requires the investment of time and energy to create trusting relationships with trainees so that we can have well-founded gut feelings about our trainees." <http://www.ncbi.nlm.nih.gov/pubmed/25803411>

ten Cate O, Scheele F. Competency-based postgraduate training: Can we bridge the gap between theory and clinical practice? *Acad Med* 2007;82(6):542-547.

The introduction of competency-based postgraduate medical training, as recently stimulated by national governing bodies in Canada, the United States, the United Kingdom, The Netherlands, and other countries, is a major advancement, but at the same time it evokes critical issues of curricular implementation. A source of concern is the translation of general competencies into the practice of clinical teaching. The authors observe confusion around the term competency, which may have adverse effects when a teaching and assessment program is to be designed. This article aims to clarify the competency terminology. To connect the ideas behind a competency framework with the work environment of patient care, the authors propose to analyze the critical activities of professional practice and relate these to predetermined competencies. The use of entrustable professional activities (EPAs) and statements of awarded responsibility (STARs) may bridge a potential gap between the theory of competency-based education and clinical practice. EPAs reflect those activities that together constitute the profession. Carrying out most of these EPAs requires the possession of several competencies. The authors propose not to go to great lengths to assess competencies as such, in the way they are abstractly defined in competency frameworks but, instead, to focus on the observation of concrete critical clinical activities and to infer the presence of multiple competencies from several observed activities. Residents may then be awarded responsibility for EPAs. This can serve to move toward competency-based training, in which a flexible length of training is possible and the outcome of training becomes more important than its length. <http://www.ncbi.nlm.nih.gov/pubmed/17525536>

Touchie C, ten Cate O. The promise, perils, problems and progress of competency-based medical education. *Med Educ* 2016;50(1):93-100.

CONTEXT: Competency-based medical education (CBME) is being adopted wholeheartedly by organisations worldwide in the hope of meeting today's expectations for training a competent doctor. But are we, as medical educators, fulfilling this promise? METHODS: The authors explore, through a personal viewpoint, the problems identified with CBME and the progress made through the development of milestones and entrustable professional activities (EPAs). RESULTS: Proponents of CBME have strong reasons to keep developing and supporting this broad movement in medical education. Critics, however, have legitimate reservations. The authors observe that the recent increase in use of milestones and EPAs can strengthen the purpose of CBME and counter some of the concerns voiced, if properly implemented. CONCLUSIONS: The authors conclude with suggestions for the future and how using EPAs could lead us one step closer to the goals of not only competency-based medical education but also competency-based medical practice. <http://www.ncbi.nlm.nih.gov/pubmed/26695469>

Promotion of Understanding and Retention

Ericsson KA. Deliberate practice and acquisition of expert performance: A general overview. *Acad Emerg Med* 2008;15(11):988-994.

Traditionally, professional expertise has been judged by length of experience, reputation, and perceived mastery of knowledge and skill. Unfortunately, recent research demonstrates only a weak relationship between these indicators of expertise and actual, observed performance. In fact, observed performance does not necessarily correlate with greater professional experience. Expert performance can, however, be traced to active engagement in deliberate practice (DP), where training (often designed and arranged by their teachers and coaches) is focused on improving particular tasks. DP also involves the provision of immediate feedback, time for problem-solving and evaluation, and opportunities for repeated performance to refine behavior. In this article, we draw upon the principles of DP established in other domains, such as chess, music, typing, and sports to provide insight into developing expert performance in medicine. <http://www.ncbi.nlm.nih.gov/pubmed/18778378>

Friedlander MJ, Andrews L, Armstrong EG, Aschenbrenner C, Kass JS, Ogden P, Schwartzstein R, Viggiano TR. What can medical education learn from the neurobiology of learning? *Acad Med* 2011;86(4):415-420.

The last several decades have seen a large increase in knowledge of the underlying biological mechanisms that serve learning and memory. The insights gleaned from neurobiological and cognitive neuroscientific experimentation in

humans and in animal models have identified many of the processes at the molecular, cellular, and systems levels that occur during learning and the formation, storage, and recall of memories. Moreover, with the advent of noninvasive technologies to monitor patterns of neural activity during various forms of human cognition, the efficacy of different strategies for effective teaching can be compared. Considerable insight has also been developed as to how to most effectively engage these processes to facilitate learning, retention, recall, and effective use and application of the learned information. However, this knowledge has not systematically found its way into the medical education process. Thus, there are considerable opportunities for the integration of current knowledge about the biology of learning with educational strategies and curricular design. By teaching medical students in ways that use this knowledge, there is an opportunity to make medical education easier and more effective. The authors present 10 key aspects of learning that they believe can be incorporated into effective teaching paradigms in multiple ways. They also present recommendations for applying the current knowledge of the neurobiology of learning throughout the medical education continuum. <http://www.ncbi.nlm.nih.gov/pubmed/21346504>

Prince M. Does active learning work? A review of the research. *J Engr Education* 2004;93(3):223-231.

This study examines the evidence for the effectiveness of active learning. It defines the common forms of active learning most relevant for engineering faculty and critically examines the core element of each method. It is found that there is broad but uneven support for the core elements of active, collaborative, cooperative and problem-based learning. http://www4.ncsu.edu/unity/lockers/users/f/felder/public/Papers/Prince_AL.pdf

Note-taking:

Boye A. Note-taking in the 21st century: Tips for instructors and students. Teaching, Learning, and Professional Development Center, Texas Tech University 2012; Retrieved August 20, 2017 from http://www.depts.ttu.edu/tlpdc/Resources/Teaching_resources/TLPCDC_teaching_resources/Documents/Notetaking_Whitepaper.pdf.

Grahame JA. Digital note-taking: Discussion of evidence and best practices. *J Physician Assist Educ* 2016;27(1):47-50.

Balancing active course engagement and comprehension with producing quality lecture notes is challenging. Although evidence suggests that handwritten note-taking may improve comprehension and learning outcomes, many students still self-report a preference for digital note-taking and a belief that it is beneficial. Future research is warranted to determine the effects on performance of digitally writing notes. Independent of the methods or software chosen, best practices should be provided to students with information to help them consciously make an educated decision based on the evidence and their personal preference. Optimal note-taking requires self-discipline, focused attention, sufficient working memory, thoughtful rewording, and decreased distractions. Familiarity with the tools and mediums they choose will help students maximize working memory, produce better notes, and aid in their retention of material presented. <https://www.ncbi.nlm.nih.gov/pubmed/26894953>

Mueller PA, Oppenheimer DM. The pen is mightier than the keyboard: Advantages of longhand over laptop note taking. *Psychol Sci* 2014;25(6):1159-1168.

Taking notes on laptops rather than in longhand is increasingly common. Many researchers have suggested that laptop note taking is less effective than longhand note taking for learning. Prior studies have primarily focused on students' capacity for multitasking and distraction when using laptops. The present research suggests that even when laptops are used solely to take notes, they may still be impairing learning because their use results in shallower processing. In three studies, we found that students who took notes on laptops performed worse on conceptual questions than students who took notes longhand. We show that whereas taking more notes can be beneficial, laptop note takers' tendency to transcribe lectures verbatim rather than processing information and reframing it in their own words is detrimental to learning. <http://www.ncbi.nlm.nih.gov/pubmed/24760141>
<http://pss.sagepub.com/content/25/6/1159.full.pdf>

Emotion and learning:

McConnell MM, Eva KW. The role of emotion in the learning and transfer of clinical skills and knowledge. *Acad Med* 2012;87(10):1316-1322.

PURPOSE: Medical school and residency are emotional experiences for trainees. Most research examining emotion in medicine has focused on negative moods associated with physician burnout and poor quality of life. However, positive emotional states also may have important influences on student learning and performance. The authors present a review of the literature on the influence of emotion on cognition, specifically how individuals learn complex skills and knowledge and how they transfer that information to new scenarios. **METHOD:** From September 2011 to February 2012, the authors searched Medline, PsycInfo, GoogleScholar, ERIC, and Web of Science, as well as the reference lists of relevant articles, for research on the interaction between emotion, learning, and knowledge transfer. They extracted representative themes and noted particularly relevant empirical findings. **RESULTS:** The authors found articles that show that emotion influences various cognitive processes that are involved in the

acquisition and transfer of knowledge and skills. More specifically, emotion influences how individuals identify and perceive information, how they interpret it, and how they act on the information available in learning and practice situations. CONCLUSIONS: There are many ways in which emotions may influence medical education. Researchers must further explore the implications of these findings to ensure that learning is not treated simply as a rational, mechanistic process but that trainees are effectively prepared to perform under a wide range of emotional conditions. <https://www.ncbi.nlm.nih.gov/pubmed/22914515>

Evaluation

Eva KW, Regehr G. "I'll never play professional football" and other fallacies of self-assessment. *J Cont Educ Health Prof* 2008;28(1):14-9.

It is generally well accepted in health professional education that self-assessment is a key step in the continuing professional development cycle. While there has been increasing discussion in the community pertaining to whether or not professionals can indeed self-assess accurately, much of this discussion has been clouded by the fact that the term self-assessment has been used in an unfortunate and confusing variety of ways. In this article we will draw distinctions between self-assessment (an ability), self-directed assessment seeking and reflection (pedagogical strategies), and self-monitoring (immediate contextually relevant responses to environmental stimuli) in an attempt to clarify the rhetoric pertaining to each activity and provide some guidance regarding the implications that can be drawn from making these distinctions. We will further explore a source of persistence in the community's efforts to improve self-assessment despite clear findings from a large body of research that we as humans do not (and, in fact, perhaps cannot) self-assess well by describing what we call a "they not we" phenomenon. Finally, we will use this phenomenon and the distinctions previously described to advocate for a variety of research projects aimed at shedding further light on the complicated relationship between self-assessment and other forms of self-regulating professional development activities. <http://www.ncbi.nlm.nih.gov/pubmed/18366120>

Holmboe ES. Realizing the promise of competency-based medical education. *Acad Med* 2015;90(4):411-413. Competency-based medical education (CBME) places a premium on both educational and clinical outcomes. The Milestones component of the Next Accreditation System represents a fundamental change in medical education in the United States and is part of the drive to realize the full promise of CBME. The Milestones framework provides a descriptive blueprint in each specialty to guide curriculum development and assessment practices. From the beginning of the Outcomes project in 1999, the Accreditation Council for Graduate Medical Education and the larger medical education community recognized the importance of improving their approach to assessment. Work-based assessments, which rely heavily on the observations and judgments of clinical faculty, are central to a competency-based approach. The direct observation of learners and the provision of robust feedback have always been recognized as critical components of medical education, but CBME systems further elevate their importance. Without effective and frequent direct observation, coaching, and feedback, the full potential of CBME and the Milestones cannot be achieved. Furthermore, simply using the Milestones as end-of-rotation evaluations to "check the box" to meet requirements undermines the intent of an outcomes-based accreditation system. In this Commentary, the author explores these challenges, addressing the concerns raised by Williams and colleagues in their Commentary. Meeting the assessment challenges of the Milestones will require a renewed commitment from institutions to meet the profession's "special obligations" to patients and learners. All stakeholders in graduate medical education must commit to a professional system of self-regulation to prepare highly competent physicians to fulfill this social contract. <http://www.ncbi.nlm.nih.gov/pubmed/25295967>

Holmboe ES. Faculty and the observation of trainees' clinical skills: Problems and opportunities. *Acad Med* 2004;79(1):16-22.

The clinical skills of medical interviewing, physical examination, and counseling remain vital to the effective care of patients, yet research continues to document serious deficiencies in clinical skills among students and residents. The most important method of evaluation is the direct observation of trainees performing these clinical skills. Standardized patients and other simulation technologies are important and reliable tools for teaching clinical skills and evaluating competence and will be incorporated in the near future as part of the United States Medical Licensing Examination. Standardized patients and simulation, however, cannot and should not replace the direct observation by faculty of trainees' clinical skills with actual patients. Faculty are in the best position to document improvement over time and to certify trainees have attained sophisticated levels of skill in medical interviewing, physical examination, and counseling. Unfortunately, current evidence suggests significant deficiencies in faculty direct observation evaluation skills. The author outlines the nature of the problems in clinical skills and their evaluation by faculty and ends with recommendations to improve the current state of faculty skills in evaluation. <http://www.ncbi.nlm.nih.gov/pubmed/14690992>

LaDonna KA, Hatala R, Lingard L, Voyer S, Watling C. Staging a performance: Learners' perceptions about direct observation during residency. *Med Educ* 2017;51(5):498-510.

CONTEXT: Evidence strongly supports that direct observation is a valid and reliable assessment tool; support for its impact on learning is less compelling, and we know that some learners are ambivalent about being observed. However, learners' perceptions about the impact of direct observation on their learning and professional development remain underexplored. To promote learning, we need to understand what makes direct observation valuable for learners. METHODS: Informed by constructivist grounded theory, we interviewed 22 learners about their observation experiences. Data collection and analysis occurred iteratively; themes were identified using constant comparative analysis. RESULTS: Direct observation was widely endorsed as an important educational strategy, albeit one that created significant anxiety. Opaque expectations exacerbated participants' discomfort, and participants described that being observed felt like being assessed. Consequently, participants exchanged their 'usual' practice for a 'textbook' approach; alterations to performance generated uncertainty about their role, and raised questions about whether observers saw an authentic portrayal of their knowledge and skill. CONCLUSION: An 'observer effect' may partly explain learners' ambivalence about direct observation; being observed seemed to magnify learners' role ambiguity, intensify their tensions around professional development and raise questions about the credibility of feedback. In turn, an observer effect may impact learners' receptivity to feedback and may explain, in part, learners' perceptions that useful feedback is scant. For direct observation to be valuable, educators must be explicit about expectations, and they must be aware that how learners perform in the presence of an observer may not reflect what they do as independent practitioners. To nurture learners' professional development, educators must create a culture of observation-based coaching that is divorced from assessment and is tailored to developing learners' identities as practitioners of both the art and the science of medicine.

<https://www.ncbi.nlm.nih.gov/pubmed/28247495>

Lipsett PA, Harris I, Downing S. Resident self-other assessor agreement: Influence of assessor, competency, and performance level. *Arch Surg* 2011;146(8):901-906.

OBJECTIVES: To review the literature on self-assessment in the context of resident performance and to determine the correlation between self-assessment across competencies in high- and low-performing residents and assessments performed by raters from a variety of professional roles (peers, nurses, and faculty). DESIGN: Retrospective analysis of prospectively collected anonymous self-assessment and multiprofessional (360) performance assessments by competency and overall. SETTING: University-based academic general surgical program. PARTICIPANTS: Sixty-two residents rotating in general surgery. MAIN OUTCOME MEASURES: Mean difference for each self-assessment dyad (self-peer, self-nurse, and self-attending physician) by resident performance quartile, adjusted for measurement error, correlation coefficients, and summed differences across all competencies. RESULTS: Irrespective of self-other dyad, residents asked to rate their global performance overestimated their skills. Residents in the upper quartile underestimated their specific skills while those in the lowest-performing quartile overestimated their abilities when compared with faculty, peers, and especially nurse raters. Moreover, overestimation was greatest in competencies related to interpersonal skills, communication, teamwork, and professionalism. CONCLUSIONS: Rater, level of performance, and the competency being assessed all influence the comparison of the resident's self-assessment and those of other raters. Self-assessment of competencies related to behavior may be inaccurate when compared with raters from various professions. Residents in the lowest-performing quartile are least able to identify their weakness. These data have important implications for residents, program directors, and the public and suggest that strategies that help the lowest-performing residents recognize areas in need of improvement are needed. <https://www.ncbi.nlm.nih.gov/pubmed/?term=Bing-you+tango>

Lo L, Regehr G. Medical students' understanding of directed questioning by their clinical preceptors. *Teach Learn Med* 2017;29(1):5-12.

Phenomenon: Throughout clerkship, preceptors ask medical students questions for both assessment and teaching purposes. However, the cognitive and strategic aspects of students' approaches to managing this situation have not been explored. Without an understanding of how students approach the question and answer activity, medical educators are unable to appreciate how effectively this activity fulfills their purposes of assessment or determine the activity's associated educational effects. APPROACH: A convenience sample of nine 4th-year medical students participated in semistructured one-on-one interviews exploring their approaches to managing situations in which they have been challenged with questions from preceptors to which they do not know the answer. Through an iterative and recursive analytic reading of the interview transcripts, data were coded and organized to identify themes relevant to the students' considerations in answering such questions. FINDINGS: Students articulated deliberate strategies for managing the directed questioning activity, which at times focused on the optimization of their learning but always included considerations of image management. Managing image involved projecting not only being knowledgeable but also being teachable. The students indicated that their considerations in selecting an appropriate strategy in a given situation involved their perceptions of their preceptors' intentions and preferences as well as several contextual factors. Insights: The medical students we interviewed were quite sophisticated in their understanding of the social nuances of the directed questioning process and described a variety of contextually

invoked strategies to manage the situation and maintain a positive image.

<https://www.ncbi.nlm.nih.gov/pubmed/27541066>

Wear D, Kokinova M, Keck-McNulty C, Aultman J. Pimping: Perspectives of 4th year medical students. *Teach Learn Med* 2005;17(2):184-191.

BACKGROUND: A well-known phenomenon among U.S. medical students known as pimping, or the pedagogical device of questioning students in the clinical setting, receives virtually no attention in medical literature. **PURPOSE:** Identifying 4th-year medical students' relevant knowledge and attitudes about pimping may help educators understand the range of beliefs about pimping and the role it plays in the socialization process into the medical community. **METHODS:** Over a 2-month period, 11 fourth-year medical students at a Midwest medical school were asked 6 open-ended questions focusing on pimping as understood and experienced in the clinical setting. Investigators individually analyzed the interview data using qualitative methods to characterize students' experiences and recurring ideas and concepts. **RESULTS:** All students noted the hierarchical nature of pimping, viewing it as a tool for attendings or residents to assess students' levels of knowledge. Although some students experienced malignant pimping, humiliated by incessant questioning or questions inappropriate to their level of training, all the students in the sample were positive about pimping and its effectiveness as a pedagogical tool. Investigators found that location within the clinical setting determines how students define and understand the motives for pimping. **CONCLUSIONS:** Understanding how students define and experience the pimping phenomenon prepares medical educators to scrutinize pimping as a pedagogical tool and to provide the most effective and encouraging environment for students. <https://www.ncbi.nlm.nih.gov/pubmed/15833730>

Feedback

*Bing-You R, Varaklis K, Hayes V, Trowbridge R, Kemp H, McKelvy. The feedback tango: An integrative review and analysis of the content of the teacher-learner feedback exchange. *Acad Med* 2017;93(4):657-663.

PURPOSE: To conduct an integrative review and analysis of the literature on the content of feedback to learners in medical education. **METHOD:** Following completion of a coping review in 2016, the authors analyzed a subset of articles published through 2015 describing the analysis of feedback exchange content in various contexts: audiotapes, clinical examination, feedback cards, multisource feedback, videotapes, and written feedback. Two reviewers extracted data from these articles and identified common themes. **RESULTS:** Of the 51 included articles, about half (49%) were published since 2011. Most involved medical students (43%) or residents (43%). A leniency bias was noted in many (37%), as there was frequently reluctance to provide constructive feedback. More than one-quarter (29%) indicated the feedback was low in quality (e.g., too general, limited amount, no action plans). Some (16%) indicated faculty dominated conversations, did not use feedback forms appropriately, or provided inadequate feedback, even after training. Multiple feedback tools were used, with some articles (14%) describing varying degrees of use, completion, or legibility. Some articles (14%) noted the impact of the gender of the feedback provider or learner. **CONCLUSIONS:** The findings reveal that the exchange of feedback is troubled by low-quality feedback, leniency bias, faculty deficient in feedback competencies, challenges with multiple feedback tools, and gender impacts. Using the tango dance form as a metaphor for this dynamic partnership, the authors recommend ways to improve feedback for teachers and learners willing to partner with each other and engage in the complexities of the feedback exchange. <https://www.ncbi.nlm.nih.gov/pubmed/?term=Bing-you+tango>

Bowen L, Marshall M, Murdoch-Eaton D. Medical student perceptions of feedback and feedback behaviors within the context of the "Educational Alliance". *Acad Med* 2017 Sep;92(9):1303-1312.

PURPOSE: Using the "educational alliance" as a conceptual framework, the authors explored medical students' beliefs about feedback and how their feedback behaviors reflect their perceptions. **METHOD:** Five focus groups (four to six medical students each) at one UK medical school in 2015 were used to capture and elucidate learners' feedback perceptions and behaviors within the context of the learner-educator relationship. A map of key feedback opportunities across the program was used as a tool for exploring student engagement with the feedback process. Qualitative data were analyzed using an approach based on grounded theory principles. **RESULTS:** Three learner feedback behaviors emerged: recognizing, using, and seeking feedback. Five core themes influencing these behaviors were generated: learner beliefs, attitudes, and perceptions; relationships; teacher attributes; mode of feedback; and learning culture. Conceptual models illustrating the relationships between the themes and each behavior were developed. Learning culture influenced all three behaviors with a wide context of influences. **CONCLUSIONS:** Ensuring that feedback leads to improved performance requires more than training educators in best practices. The conceptual models support the educational alliance framework and illustrate the context and complexity of learning culture surrounding the educational relationship, learner, and feedback exchange. The educational alliance approach is underpinned by a mutual understanding of purpose and responsibility. Enhancing learners' feedback literacy skills seems to be the key aspect of the educational alliance in need of attention. Empowering learners to recognize, seek, and use feedback received within diverse learning cultures is essential. <https://www.ncbi.nlm.nih.gov/pubmed/28272114>

Burack JH, Irby DM, Carline JD, Root RK, Larson EB. Teaching compassion and respect: Attending physicians' responses to problematic behaviors. *J Gen Intern Med* 1999;14(1):49-55.

OBJECTIVE: To describe how and why attending physicians respond to learner behaviors that indicate negative attitudes toward patients. **SETTING:** Inpatient general internal medicine service of a university-affiliated public hospital. **PARTICIPANTS:** Four ward teams, each including an attending physician, a senior medicine resident, two interns, and up to three medical students. **DESIGN:** Teams were studied using participant observation of rounds (160 hours); in-depth semistructured interviews (n = 23); a structured task involving thinking aloud (n = 4, attending physicians); and patient chart review. Codes, themes, and hypotheses were identified from transcripts and field notes, and iteratively tested by blinded within-case and cross-case comparisons. **MAIN RESULTS:** Attending physicians identified three categories of potentially problematic behaviors: showing disrespect for patients, cutting corners, and outright hostility or rudeness. Attending physicians were rarely observed to respond to these problematic behaviors. When they did, they favored passive nonverbal gestures such as rigid posture, failing to smile, or remaining silent. Verbal responses included three techniques that avoided blaming learners: humor, referring to learners' self-interest, and medicalizing interpersonal issues. Attending physicians did not explicitly discuss attitudes, refer to moral or professional norms, "lay down the law," or call attention to their modeling, and rarely gave behavior-specific feedback. Reasons for not responding included lack of opportunity to observe interactions, sympathy for learner stress, and the unpleasantness, perceived ineffectiveness, and lack of professional reward for giving negative feedback. **CONCLUSIONS:** Because of uncertainty about appropriateness and effectiveness, attending physicians were reluctant to respond to perceived disrespect, uncaring, or hostility toward patients by members of their medical team. They tended to avoid, rationalize, or medicalize these behaviors, and to respond in ways that avoided moral language, did not address underlying attitudes, and left room for face-saving reinterpretations. Although these oblique techniques are sympathetically motivated, learners in stressful clinical environments may misinterpret, undervalue, or entirely fail to notice such subtle feedback.

<http://www.ncbi.nlm.nih.gov/pubmed/9893091>

Bynum WE. Filling the feedback gap: The unrecognized role of shame and guilt in the feedback cycle. *Med Educ* 2015;49(7):644-652.

In his commentary on the van de Ridder, et al. article in this issue entitled, "Variables that affect the process and outcome of feedback: a meta-review," Bynum feels a critical gap is apparent in the feedback literature regarding factors that influence how feedback is communicated and received. He suggests this gap be addressed with further research including exploration of the roles of shame and guilt. Shame is experienced after feedback is given when "the recipient adopts a negative evaluation of his or her self, as opposed to the behavior or action under scrutiny" and can lead to withdrawal, and ignoring a problem. Guilt, as a reaction to feedback, focuses on the individual's behavior rather than the self and is preferable to shame because it can stimulate reparative action and a desire to prevent an undesirable behavior from occurring again. Shame can be avoided by a focus on specific actions that can be changed. He also calls for further research on the susceptibility to shame, as well as how preparation for adversity affects a learner's response to clinical training which entails intense scrutiny including constructive feedback. In addition, he suggests institutions "eradicate humiliating treatment and provide faculty development on shame-free approaches to teaching in order to optimize the manner in which difficult feedback is communicated."

<http://www.ncbi.nlm.nih.gov/pubmed/26077209>

French JC, Colbert CY, Pien LC, Dannefer EF, Taylor CA. Targeted feedback in the milestones era: Utilization of the ask-tell-ask feedback model to promote reflection and self-assessment. *J Surg Educ* 2015;72(6):e274-279.

BACKGROUND: The Accreditation Council for Graduate Medical Education's Milestones Project focuses trainee education on the formation of valued behaviors and skills believed to be necessary for trainees to become independent practitioners. The development and refinement of behaviors and skills outlined within the milestones will require learners to monitor, reflect, and assess their own performance over time. External feedback provides an opportunity for learners to recalibrate their self-assessments, thereby enabling them to develop better self-monitoring and self-assessment skills. Yet, feedback to trainees is frequently generic, such as "great job," "nice work," or "you need to read more." **PURPOSE:** In this article, we describe a feedback model that faculty can use to provide specific feedback, while increasing accountability for learners. We offer practical examples of its use in a variety of settings in the milestone era. **INNOVATION:** The Ask-Tell-Ask (ATA) patient communication skills strategy, which was adapted for use as a trainee feedback model 10 years ago at our institution, is a learner-centered approach for reinforcing and modifying behaviors. The model is efficient, promotes learner accountability, and helps trainees develop reflection and self-assessment skills. A feedback agreement further enhances ATA by establishing a shared understanding of goals for the educational encounter. **CONCLUSION:** The ATA feedback model, combined with a feedback agreement, encourages learners to self-identify strengths and areas for improvement, before receiving feedback. Personal monitoring, reflection, self-assessment, and increased accountability make ATA an ideal learner-centered feedback model for the milestones era, which focuses on performance improvement over

time. We believe the introduction of the ATA feedback model in surgical training programs is a step in the right direction towards meaningful programmatic culture change. <https://www.ncbi.nlm.nih.gov/pubmed/26123726>

Gardner AK, Scott DJ. Repaying in kind: Examination of the reciprocity effect in faculty and resident evaluations. *J Surg Educ* 2016;73(6):e91-e94.

BACKGROUND: Although the reciprocity hypothesis (that trainees have a tendency to modify evaluations based on the grades they receive from instructors) has been documented in other fields, very little work has examined this phenomenon in the surgical residency environment. The purpose of this study was to investigate the extent to which lenient-grading faculty receive higher evaluations from surgery residents. **METHODS:** Evaluation data from 2 consecutive academic years were collected retrospectively at a large university-based General Surgery residency program. Monthly faculty evaluations of residents (15 items) and resident evaluations of faculty (8 items; 1 = never demonstrates, 10 = always demonstrates) were included. Correlation and regression analyses were conducted with SPSS version 22 (IBM; Chicago, IL). **RESULTS:** A total of 2274 faculty assessments and 1480 resident assessments were included in this study, representing 2 years of evaluations for 32 core faculty members responsible for completing all resident evaluations and 68 PGY1-5 general surgery residents. Faculty (63% men, 13.5 +/- 9.8 years out of training) represented 5 different divisions (general surgery, surgical oncology, transplant, trauma critical care, and vascular) within the general surgery department. Faculty received an average of 71.1 +/- 33.9 evaluations from residents over the course of 2 years. The average rating of faculty teaching by residents was 9.5 +/- 0.4. Residents received an average of 21.8 +/- 0.5 evaluations with average ratings of 4.2 +/- 0.4. Correlation analyses indicated a positive relationship between the average rating received from residents and the number of years since faculty completed training ($r = 0.44$, $p = 0.01$). Additionally, a significant relationship emerged between ratings received from residents and ratings given to residents ($r = 0.40$, $p = 0.04$). Regression analyses indicated that when both variables (years since training, ratings given to residents) were included in the model, only ratings given to residents remained a significant predictor of evaluation ratings received from residents ($F(1,32) = 4.40$, $p = 0.04$), with an R^2 of 0.16. Sex or division affiliation did not account for any unique variance. **CONCLUSIONS:** These findings suggest that a reciprocity effect exists between surgery faculty and resident evaluations. This effect warrants further exploration, such that efforts to mitigate the risks of providing inaccurate assessments may be developed. Providing trainees with accurate assessments is particularly important given the high-stakes use of these data for milestones, promotion, and graduation purposes, which currently do not account for this reciprocity effect. **SUMMARY:** Results suggest that there is a reciprocity effect in the faculty and resident evaluation process.

<https://www.ncbi.nlm.nih.gov/pubmed/27211878>

Kogan JR, Conforti LN, Bernabeo EC, Durning SJ, Hauer KE, Holmboe ES. Faculty staff perceptions of feedback to residents after direct observation of clinical skills. *Med Educ* 2012;46(2):201-215.

CONTEXT: Performance-based workplace assessments are increasingly important in clinical training. Given the inaccuracy of self-assessment, the provision of external feedback to residents about their clinical skills is necessary for the development of expertise. However, little is known about the processes used by faculty members in giving feedback to residents after observing them with patients. This study explores the factors that underpin faculty members' decisions regarding the feedback they give to residents after directly observing them with patients and the factors that influence how feedback is delivered. **METHODS:** In 2009, 44 general internal medicine faculty staff responsible for out-patient resident teaching from 16 internal medicine residency programmes watched four videotaped scenarios and two live scenarios of normalized residents (SRs) with normalized patients and rated the SRs using the mini-clinical evaluation exercise (mini-CEX) format. Faculty staff also provided feedback to the SRs after the live encounters. After each encounter, faculty staff were individually interviewed using a semi-structured interview. Interviews were videotaped, transcribed and analysed using grounded theory methods. **RESULTS:** Two broad themes were identified in faculty members' descriptions of the feedback process: variability in feedback techniques, and the factors that influence how faculty staff think and feel about delivering feedback. Multiple approaches to feedback delivery were observed. Faculty members' tensions in balancing positive and negative feedback, their own perceived self-efficacy, their perceptions of the resident's insight, receptivity, skill and potential, the faculty member-resident relationship and contextual factors impacted the feedback process. **CONCLUSIONS:** The provision of feedback by faculty staff to residents after observing resident-patient interactions is a complex and dynamic process and is influenced by many factors. Understanding these cognitive and affective factors may provide insight into potential new approaches to faculty development to improve faculty staff's feedback skills and the effectiveness of their feedback. <http://www.ncbi.nlm.nih.gov/pubmed/22239334>

Kost A, Combs H, Smith S, Klein E, Kritek P, Robins L, Cianciolo AT, Butani L, Gigante J, Ramani S.. A proposed conceptual framework and investigation of upward feedback receptivity in medical education. *Teach Learn Med* 2015;27(4):359-361.

PHENOMENON: In addition to giving feedback to 3rd-year clerkship students, some clerkship instructors receive feedback, requested or spontaneous, from students prior to the clerkship's end. The concept of bidirectional feedback is appealing as a means of fostering a culture of respectful communication and improvement. However,

little is known about how teachers perceive this feedback in practice or how it impacts the learning environment. **APPROACH:** We performed 24 semistructured 30-minute interviews with 3 to 7 attending physician faculty members each in Pediatrics, Internal Medicine, Family Medicine, Surgery, Psychiatry, and Obstetrics and Gynecology who taught in 3rd-year required clerkships during the 2012-2013 academic year. Questions probed teachers' experience with and attitudes toward receiving student feedback. Prompts were used to elicit stories and obtain participant demographics. Interviews were audio-recorded, transcribed, and entered into Dedoose for qualitative analysis. Researchers read transcripts holistically for meaning, designed a coding template, and then independently coded each transcript. A constant comparative approach and regular meetings were used to ensure consistent coding between research team members. **FINDINGS:** Participants ranged in age from 37 to 74, with 5 to 35 years of teaching experience. Seventy-one percent were male, and 83% identified as White. In our preliminary analysis, our informants reported a range of experience in receiving student feedback prior to the end of a clerkship, varying from no experience to having developed mechanisms to regularly request specific feedback about their programs. Most expressed openness to actively soliciting and receiving student feedback on their teaching during the clerkship although many questioned whether this process was feasible. Actual responses to receiving student feedback were mixed. Some reported having received feedback that motivated change, and others rejected the feedback they received on the grounds that it lacked validity or was inappropriate. Others expressed uncertainty about how they would react to student feedback. Faculty expressed a preference for receiving feedback about behaviors and items that were within their control. **INSIGHTS:** These findings suggest there is opportunity to pilot implementation of a structured student feedback mechanism, separate from teacher evaluations, in selected 3rd-year clerkships. Materials should be developed to help faculty solicit, understand, and respond to student feedback and to help students frame and provide the kinds of feedback to teachers that will lead to suggested improvements. Both these endeavors have the potential to improve the clinical learning environment during 3rd-year clerkships through the cultivation of respectful communication and the encouragement of improvement in teaching efforts.

<https://www.ncbi.nlm.nih.gov/pubmed/26507991>

Molloy E, Boud D. Seeking a different angle on feedback in clinical education: The learner as seeker, judge and user of performance information. *Med Educ* 2013;47(3):227-229.

In this issue of *Medical Education*, Bok et al. report factors that might influence learners' readiness to become active players in the feedback process. This approach varies from the bulk of practice guidelines that focus on the teachers' abilities to deliver high-quality feedback. However, studies demonstrate learners report that they do not receive feedback that is helpful while educators report the burden of giving feedback. Rather than a one-way transmission of information from a knowledgeable person to a less knowledgeable person, Bok et al. and other constructivists suggest feedback is not telling. The commentary authors' definition of feedback focuses on what learners do: "... feedback is a process whereby learners obtain information about their work in order to appreciate the similarities and differences between the appropriate standards for any given work, and the qualities of the work itself, in order to generate improved work." The effectiveness of feedback is contingent on the engagement and 'seeking behavior' of the learner. The rewards of engaging in feedback for the learner are two-fold; learners can improve their subsequent task performance, as well as their own capacity for making judgments about their work. Like that of Bok, et al., the commentary authors' research leads them to think that learners, rather than 'waiting for' feedback from others, should drive the process themselves. <http://www.ncbi.nlm.nih.gov/pubmed/23398007>

Rudland J, Wilkinson T, Wearn A, Nicol P, Tunny T, Owen C, O'Keefe M. A student-centred feedback model for educators. *Clin Teach* 2013;10(2): 99-102.

BACKGROUND: Effective feedback is instrumental to effective learning. Current feedback models tend to be educator driven rather than learner-centred, with the focus on how the supervisor should give feedback rather than on the role of the learner in requesting and responding to feedback. **CONTEXT:** An alternative approach emphasising the theoretical principles of student-centred and self-regulated learning is offered, drawing upon the literature and also upon the experience of the authors. **INNOVATION:** The proposed feedback model places the student in the centre of the feedback process, and stresses that the attainment of student learning outcomes is influenced by the students themselves. This model emphasises the attributes of the student, particularly responsiveness, receptiveness and reflection, whilst acknowledging the important role that the context and attributes of the supervisor have in influencing the quality of feedback. **IMPLICATIONS:** Educational institutions should consider strategies to encourage and enable students to maximise the many feedback opportunities available to them. As a minimum, educators should remind students about their central role in the feedback process, and support them to develop confidence in meeting this role. In addition, supervisors may need support to develop the skills to shift the balance of responsibility and support students in precipitating feedback moments. Research is also required to validate the proposed model and to determine how to support students to adopt self-regulatory learning, with feedback as a central platform. <http://www.ncbi.nlm.nih.gov/pubmed/23480111>

Schwarz R. The "Sandwich Approach" undermines your feedback. *Harvard Business Review Blog Network* 2013. Description of the sandwich approach of pairing negative with positive feedback and advice to avoid using it.

<https://hbr.org/2013/04/the-sandwich-approach-undermin>

Telio S, Ajjawi R, Regehr G. The “educational alliance” as a framework for reconceptualizing feedback in medical education. *Acad Med* 2015;90(5):609-614.

Feedback has long been considered a vital component of training in the health professions. Nonetheless, it remains difficult to enact the feedback process effectively. In part, this may be because, historically, feedback has been framed in the medical education literature as a unidirectional content-delivery process with a focus on ensuring the learner’s acceptance of the content. Thus, proposed solutions have been organized around mechanistic, educator-driven, and behavior-based best practices. Recently, some authors have begun to highlight the role of context and relationship in the feedback process, but no theoretical frameworks have yet been suggested for understanding or exploring this relational construction of feedback in medical education. The psychotherapeutic concept of the “therapeutic alliance” may be valuable in this regard.

In this article, the authors propose that by reorganizing constructions of feedback around an “educational alliance” framework, medical educators may be able to develop a more meaningful understanding of the context-and, in particular, the relationship-in which feedback functions. Use of this framework may also help to reorient discussions of the feedback process from effective delivery and acceptance to negotiation in the environment of a supportive educational relationship. To explore and elaborate these issues and ideas, the authors review the medical education literature to excavate historical and evolving constructions of feedback in the field, review the origins of the therapeutic alliance and its demonstrated utility for psychotherapy practice, and consider implications regarding learners’ perceptions of the supervisory relationship as a significant influence on feedback acceptance in medical education settings. <http://www.ncbi.nlm.nih.gov/pubmed/25406607>

Thomas JD, Arnold RM. Giving feedback. *J Palliat Med* 2011;14(2):233-239.

BACKGROUND: Giving feedback is a core element of medical education, one that is gaining attention but with a thin evidence base to guide medical educators. This review provides a definition of feedback and its purpose, selectively reviews the literature regarding educators’ and learners’ attitudes toward feedback, and provides an algorithm for giving feedback. **DISCUSSION:** The authors discuss the parallels between giving feedback and breaking bad news, emphasizing the importance of titrating the amount of information given, attending to affect, and making a plan for next steps. Special considerations for giving feedback in palliative care are highlighted, including the effect of heightened emotion in the clinical encounter and the difficulties of giving feedback about communication skills. <http://www.ncbi.nlm.nih.gov/pubmed/21314576>

Watling C, et al. Learning culture and feedback: An international study of medical athletes and musicians. *Med Educ* 2014;48(7):713-723.

OBJECTIVES: Feedback should facilitate learning, but within medical education it often fails to deliver on its promise. To better understand why feedback is challenging, we explored the unique perspectives of doctors who had also trained extensively in sport or music, aiming to: (i) distinguish the elements of the response to feedback that are determined by the individual learner from those determined by the learning culture, and (ii) understand how these elements interact in order to make recommendations for improving feedback in medical education. **METHODS:** Using a constructivist grounded theory approach, we conducted semi-structured interviews with 27 doctors or medical students who had high-level training and competitive or performance experience in sport (n = 15) or music (n = 12). Data were analysed iteratively using constant comparison. Key themes were identified and their relationships critically examined to derive a conceptual understanding of feedback and its impact. **RESULTS:** We identified three essential sources of influence on the meaning that feedback assumed: the individual learner; the characteristics of the feedback, and the learning culture. Individual learner traits, such as motivation and orientation toward feedback, appeared stable across learning contexts. Similarly, certain feedback characteristics, including specificity, credibility and actionability, were valued in sport, music and medicine alike. Learning culture influenced feedback in three ways: (i) by defining expectations for teachers and teacher-learner relationships; (ii) by establishing norms for and expectations of feedback, and (iii) by directing teachers’ and learners’ attention toward certain dimensions of performance. Learning culture therefore neither creates motivated learners nor defines ‘good feedback’; rather, it creates the conditions and opportunities that allow good feedback to occur and learners to respond. **CONCLUSIONS:** An adequate understanding of feedback requires an integrated approach incorporating both the individual and the learning culture. Our research offers a clear direction for medicine’s learning culture: normalize feedback; promote trusting teacher-learner relationships; define clear performance goals, and ensure that the goals of learners and teachers align. <https://www.ncbi.nlm.nih.gov/pubmed/24909533>

Wenrich MD, Jackson MB, Maestas RR, Wolfhagen IHAP, Scherpbier AJJ.. From cheerleader to coach: The developmental progression of bedside teachers in giving feedback to early learners. *Acad Med* 2015;90(11 Suppl):S91-97.

BACKGROUND: Medical students learn clinical skills at the bedside from teaching clinicians, who often learn to teach by teaching. Little is known about the process of becoming an effective clinical teacher. Understanding how

teaching skills and approaches change with experience may help tailor faculty development for new teachers. Focusing on giving feedback to early learners, the authors asked: What is the developmental progression of clinician-teachers as they learn to give clinical skills feedback to medical students? **METHOD:** This qualitative study included longitudinal interviews with clinician-teachers over five years in a new clinical skills teaching program for preclinical medical students. Techniques derived from grounded theory were used for initial analyses. The current study focused on one theme identified in initial analyses: giving feedback to students. Transcript passages were organized by interview year, coded, and discussed in year clusters; thematic codes were compared and emergent codes developed. **RESULTS:** Themes related to giving feedback demonstrated a dyadic structure: characteristic of less experienced teachers versus characteristic of experienced teachers. Seven dominant dyadic themes emerged, including teacher as cheerleader versus coach, concern about student fragility versus understanding resilience, and focus on creating a safe environment versus challenging students within a safe environment. **CONCLUSIONS:** With consistent teaching, clinical teachers demonstrated progress in giving feedback to students in multiple areas, including understanding students' developmental trajectory and needs, developing tools and strategies, and adopting a dynamic, challenging, inclusive team approach. Ongoing teaching opportunities with targeted faculty development may help improve clinician-teachers' feedback skills and approaches. <https://www.ncbi.nlm.nih.gov/pubmed/26505108>

Promotion of Self-Directed Learning

Duran-Nelson A, Gladding S, Beattie J, Nixon LJ. Should we Google it? Resource use by internal medicine residents for point-of-care clinical decision making. *Acad Med* 2013;88(6):788-794.

PURPOSE: To determine which resources residents use at the point-of-care (POC) for decision making, the drivers for selection of these resources, and how residents use Google/Google Scholar to answer clinical questions at the POC. **METHOD:** In January 2012, 299 residents from three internal medicine residencies were sent an electronic survey regarding resources used for POC decision making. Resource use frequency and factors influencing choice were determined using descriptive statistics. Binary logistic regression analysis was performed to determine relationships between the independent variables. **RESULTS:** A total of 167 residents (56%) responded; similar numbers responded at each level of training. Residents most frequently reported using UpToDate and Google at the POC at least daily (85% and 63%, respectively), with speed and trust in the quality of information being the primary drivers of selection. Google, used by 68% of residents, was used primarily to locate Web sites and general information about diseases, whereas Google Scholar, used by 30% of residents, tended to be used for treatment and management decisions or locating a journal article. **CONCLUSIONS:** The findings suggest that internal medicine residents use UpToDate most frequently, followed by consultation with faculty and the search engines Google and Google Scholar; speed, trust, and portability are the biggest drivers for resource selection; and time and information overload appear to be the biggest barriers to resources such as Ovid MEDLINE. Residents frequently used Google and may benefit from further training in information management skills. <http://www.ncbi.nlm.nih.gov/pubmed/23619072>

Nothnagle M, Anandarajah G, Goldman RE, Reis S. Struggling to be self-directed: Residents' paradoxical beliefs about learning. *Acad Med* 2011;86(12):1539-1544.

PURPOSE: Self-directed learning (SDL) skills serve as the basis for physician lifelong learning; however, residency training does not typically emphasize SDL skills. To understand residents' needs regarding SDL curricula, the authors used qualitative methods to examine the residency learning culture and residents' views of SDL. **METHOD:** The authors conducted individual, in-depth, semistructured interviews with all 13 final-year residents at the Brown University Family Medicine Residency Program. Interviews were audio taped and transcribed verbatim. Using an iterative individual and group process, four researchers conducted a qualitative analysis of the transcripts, identifying major themes and higher-order interpretations. **RESULTS:** Major themes included resident beliefs about learning, the learning culture in residency, and developmental progress in learning. Four paradoxes emerged in the analysis: (1) Residents understand and value the concept of SDL, but they engage in limited goal setting and reflection and report lack of skills to manage their own learning, particularly in the clinical setting. (2) Despite being immersed in what aims to be a learner-centered culture, many residents still value traditional, teacher-centered approaches. (3) Residents recognize patient care as the most powerful stimulus for SDL, but they often perceive patient care and learning as competing priorities. (4) Residents desire external guidance for SDL. **CONCLUSIONS:** Graduating residents lacked confidence in their SDL skills and their ability to manage their learning, especially in clinical settings. Fostering SDL skills during residency will likely require training and guidance for SDL as well as changes in the structure and culture of residency. <http://www.ncbi.nlm.nih.gov/pubmed/22030764>

Premkumar K, Pahwa P, Banerjee A, Baptiste K, Bhatt H, Lim HJ. Does medical training promote or deter self-directed learning? A longitudinal mixed methods study. *Acad Med* 2013;88(11):1754-1764.

PURPOSE: The School of Medicine, University of Saskatchewan curriculum promotes self-direction as one of its learning philosophies. The authors sought to identify changes in self-directed learning (SDL) readiness during

training. METHOD: Guglielmino's SDL Readiness Scale (SDLRS) was administered to five student cohorts (N = 375) at admission and the end of every year of training, 2006 to 2010. Scores were analyzed using repeated-measurement analysis. A focus group and interviews captured students' and instructors' perceptions of self-direction. RESULTS: Overall, the mean SDLRS score was 230.6; men (n = 168) 229.5; women (n = 197) 232.3, higher than in the average adult population. However, the authors were able to follow only 275 students through later years of medical education. There were no significant effects of gender, years of premedical training, and Medical College Admission Test scores on SDLRS scores. Older students were more self-directed. There was a significant drop in scores at the end of year one for each of the cohorts ($P < .001$), and no significant change to these SDLRS scores as students progressed through medical school. Students and faculty defined SDL narrowly and had similar perceptions of curricular factors affecting SDL. CONCLUSIONS: The initial scores indicate high self-direction. The drop in scores one year after admission, and the lack of change with increased training, show that the current educational interventions may require reexamination and alteration to ones that promote SDL. Comparison with schools using a different curricular approach may bring to light the impact of curriculum on SDL. <http://www.ncbi.nlm.nih.gov/pubmed/24072133>

Sawatsky AP, Ratelle JT, Bonnes SL, Egginton JS, Beckman TJ. A model of self-directed learning in internal medicine residency: A qualitative study using grounded theory. *BMC Med Educ* 2017;17(1):31. BACKGROUND: The traditional lecture is used by many residency programs to fulfill the mandate for regular didactic sessions, despite limited evidence to demonstrate its effectiveness. Active teaching strategies have shown promise in improving medical knowledge but have been challenging to implement within the constraints of residency training. We developed and evaluated an innovative structured format for interactive teaching within the residency noon conference. METHODS: We developed an ACTIVE teaching format structured around the following steps: assemble (A) into groups, convey (C) learning objectives, teach (T) background information, inquire (I) through cases and questions, verify (V) understanding, and explain (E) answer choices and educate on the learning points. We conducted a prospective, controlled study of the ACTIVE teaching format versus the standard lecture format, comparing resident satisfaction, immediate knowledge achievement and long-term knowledge retention. We qualitatively assessed participating faculty members' perspectives on the faculty development efforts and the feasibility of teaching using the ACTIVE format. RESULTS: Sixty-nine internal medicine residents participated in the study. Overall, there was an improvement in perceived engagement using the ACTIVE teaching format (4.78 vs. 3.80, $P < 0.01$), with no increase in stress or decrement in break time. There was an improvement in initial knowledge achievement with the ACTIVE teaching format (overall absolute score increase of 11%, $P = 0.04$) and a trend toward improvement in long-term knowledge retention. Faculty members felt adequately prepared to use the ACTIVE teaching format, and enjoyed teaching with the ACTIVE teaching format more than the standard lecture. CONCLUSIONS: A structured ACTIVE teaching format improved resident engagement and initial knowledge, and required minimal resources. The ACTIVE teaching format offers an exciting alternative to the standard lecture for resident noon conference and is easy to implement. <http://www.ncbi.nlm.nih.gov/pubmed/24985781>

II. On Additional Topics

Gender

Pingleton SK, et al. Silent bias: Challenges, obstacles, and strategies for leadership development in academic medicine-lessons from oral histories of women professors at the University of Kansas. *Acad Med* 2016;91(8):1151-1157.

PURPOSE: Despite dramatic increases in female learners and junior faculty, a significant gap remains in female leadership in academic medicine. To assess challenges and obstacles encountered, strategies for academic success, and lessons learned for leadership development, the authors conducted an in-depth study of women full professors. METHOD: The authors used a qualitative oral history approach, interviewing 87% of the cohort of female full professors at one Midwestern medical school in 2013 using a pretested, open-ended, semistructured interview guide. Interviews were videotaped and the audio recordings transcribed. Content was sorted into categories and key themes identified within each category. RESULTS: Participants described significant challenges: being treated with "silent bias," "being ignored," and being seen as an "other." Coping strategies included downplaying, keeping a distance, employing humor, and using symbols (e.g., white coat) to carefully present themselves. Explanations for success included intelligence, meritocracy, being even-tempered, and carefully constructing femininity. The participants recommended individual skills and actions to prepare for leadership development. Virtually all women could describe an individual mentor (sponsor), usually male, who provided essential assistance for their career success. At the same time, they stressed the importance of institutional support for diversity, especially with child care. CONCLUSIONS: Attaining "full professor" status is the pinnacle of academic success. Women who successfully navigated this academic ladder describe significant external and internal challenges that require multiple strategies to overcome. Leadership development entails a combination of individual support through mentors and sponsors,

self-education and reflection, and organizational structural support to promote diversity.
<http://www.ncbi.nlm.nih.gov/pubmed/26886809>

Riese A, Rappaport L, Alverson B, Park S, Rockney RM. Clinical performance evaluations of third-year medical students and association with student and evaluator gender. *Acad Med* 2017;92(6):835-840.

PURPOSE: Clinical performance evaluations are major components of medical school clerkship grades. But are they sufficiently objective? This study aimed to determine whether student and evaluator gender is associated with assessment of overall clinical performance. **METHOD:** This was a retrospective analysis of 4,272 core clerkship clinical performance evaluations by 829 evaluators of 155 third-year students, within the Alpert Medical School grading database for the 2013-2014 academic year. Overall clinical performance, assessed on a three-point scale (meets expectations, above expectations, exceptional), was extracted from each evaluation, as well as evaluator gender, age, training level, department, student gender and age, and length of observation time. Hierarchical ordinal regression modeling was conducted to account for clustering of evaluations. **RESULTS:** Female students were more likely to receive a better grade than males (adjusted odds ratio [AOR] 1.30, 95% confidence interval [CI] 1.13-1.50), and female evaluators awarded lower grades than males (AOR 0.72, 95% CI 0.55-0.93), adjusting for department, observation time, and student and evaluator age. The interaction between student and evaluator gender was significant ($P = .03$), with female evaluators assigning higher grades to female students, while male evaluators' grading did not differ by student gender. Students who spent a short time with evaluators were also more likely to get a lower grade. **CONCLUSIONS:** A one-year examination of all third-year clerkship clinical performance evaluations at a single institution revealed that male and female evaluators rated male and female students differently, even when accounting for other measured variables. <https://www.ncbi.nlm.nih.gov/pubmed/28099178>

Learning Theory

Taylor DC, Hamdy H. Adult learning theories: Implications for learning and teaching in medical education: AMEE Guide No. 83. *Med Teach* 2013;35(11):e1561-1572.

There are many theories that explain how adults learn and each has its own merits. This Guide explains and explores the more commonly used ones and how they can be used to enhance student and faculty learning. The Guide presents a model that combines many of the theories into a flow diagram which can be followed by anyone planning learning. The schema can be used at curriculum planning level, or at the level of individual learning. At each stage of the model, the Guide identifies the responsibilities of both learner and educator. The role of the institution is to ensure that the time and resources are available to allow effective learning to happen. The Guide is designed for those new to education, in the hope that it can unravel the difficulties in understanding and applying the common learning theories, whilst also creating opportunities for debate as to the best way they should be used.

<https://www.ncbi.nlm.nih.gov/pubmed/24004029>

Weidman J, Baker K. The cognitive science of learning: Concepts and strategies for the educator and learner. *Anesth Analg* 2015;121(6):1586-1599.

Education is the fundamental process used to develop and maintain the professional skills of physicians. Medical students, residents, and fellows are expected to learn considerable amounts of information as they progress toward board certification. Established practitioners must continue to learn in an effort to remain up-to-date in their clinical realm. Those responsible for educating these populations endeavor to teach in a manner that is effective, efficient, and durable. The study of learning and performance is a subdivision of the field of cognitive science that focuses on how people interpret and process information and how they eventually develop mastery. A deeper understanding of how individuals learn can empower both educators and learners to be more effective in their endeavors. In this article, we review a number of concepts found in the literature on learning and performance. We address both the theoretical principles and the practical applications of each concept. Cognitive load theory, constructivism, and analogical transfer are concepts particularly beneficial to educators. An understanding of goal orientation, metacognition, retrieval, spaced learning, and deliberate practice will primarily benefit the learner. When these concepts are understood and incorporated into education and study, the effectiveness of learning is significantly improved. <https://www.ncbi.nlm.nih.gov/pubmed/26579660>

Millennials

Borges NJ, Manuel RS, Elam CL, Jones BJ. Comparing millennial and generation X medical students at one medical school. *Acad Med* 2006;81(6):571-576.

PURPOSE: Two main generational cohorts comprising students enrolled in medical schools today are Generation Xers (born 1965–1980) and Millennial students (born 1981–1999). A subset is Cuspars (born 1975–1980), who share traits with both generations. Population theorists ascribe different personal characteristics, attitudes, and preferences to each group. The authors examined whether selected characteristics describing Generation X and Millennial students were quantifiable using a personality measure. Differences among Generation X, Millennial, and Cuspar medical students were investigated. **METHOD:** Eight hundred and nine medical students (399 females and 410 males) who matriculated between 1989–94 and 2001–04 at the Northeastern Ohio Universities College of

Medicine completed the 16 Personality Factor Questionnaire (16PF). Differences in responses to the 16PF among the three generations were analyzed using multivariate analysis of variance (MANOVA). RESULTS: Analyses showed significant differences for Generation X versus Millennial students on 10 of the 16 personality factors. Millennial students scored significantly higher than Generation X students on factors including Rule-Consciousness, Emotional Stability, and Perfectionism; Generation X students scored higher than Millennials on Self-Reliance. Millennials also were significantly different from Generation Xers on several other factors. Significant differences were noted among Cuspars, Generation Xers, and Millennials. CONCLUSIONS: The 16PF is a useful tool to examine differences among these groups and to help understand the factors that constitute their personalities. Given differences among the generational groups, the authors forecast possible educational implications for medical school academic affairs and student services, and suggest areas for future research.

<https://www.ncbi.nlm.nih.gov/pubmed/16728812>

Borges NJ, Manuel RS, Elam CL, Jones BJ. Differences in motives between Millennial and Generation X medical students. *Med Educ* 2010;44(6):570-576.

OBJECTIVES Three domains comprise the field of human assessment: ability, motive and personality. Differences in personality and cognitive abilities between generations have been documented, but differences in motive between generations have not been explored. This study explored generational differences in medical students regarding motives using the Thematic Apperception Test (TAT). METHODS Four hundred and twenty six students (97% response rate) at one medical school (Generation X = 229, Millennials = 197) who matriculated in 1995 & 1996 (Generation X) or in 2003 & 2004 (Millennials) wrote a story after being shown two TAT picture cards. Student stories for each TAT card were scored for different aspects of motives: Achievement, Affiliation, and Power. RESULTS A multiple analysis of variance ($p < 0.05$) showed significant differences between Millennials' and Generation X-ers' needs for Power on both TAT cards and needs for Achievement and Affiliation on one TAT card. The main effect for gender was significant for both TAT cards regarding Achievement. No main effect for ethnicity was noted. CONCLUSIONS Differences in needs for Achievement, Affiliation and Power exist between Millennial and Generation X medical students. Generation X-ers scored higher on the motive of Power, whereas Millennials scored higher on the motives of Achievement and Affiliation. <https://www.ncbi.nlm.nih.gov/pubmed/20604853>

Desy J R, Reed DA, Wolanskyj AP. Milestones and Millennials: A perfect pairing-competency-based medical education and the learning preferences of Generation Y. *Mayo Clin Proc* 2017;92(2):243-250.

Millennials are quickly becoming the most prevalent generation of medical learners. These individuals have a unique outlook on education and have different preferences and expectations than their predecessors. As evidenced by its implementation by the Accreditation Council for Graduate Medical Education in the United States and the Royal College of Physicians and Surgeons in Canada, competency based medical education is rapidly gaining international acceptance. Characteristics of competency based medical education can be perfectly paired with Millennial educational needs in several dimensions including educational expectations, the educational process, attention to emotional quotient and professionalism, assessment, feedback, and intended outcomes. We propose that with its attention to transparency, personalized learning, and frequent formative assessment, competency based medical education is an ideal fit for the Millennial generation as it realigns education and assessment with the needs of these 21st century learners. <https://www.ncbi.nlm.nih.gov/pubmed/28160874>

Roberts D H, Newman LR, Schwartzstein RM. Twelve tips for facilitating Millennials' learning. *Med Teach* 2012;34(4):274-278.

BACKGROUND: The current, so-called "Millennial" generation of learners is frequently characterized as having deep understanding of, and appreciation for, technology and social connectedness. This generation of learners has also been molded by a unique set of cultural influences that are essential for medical educators to consider in all aspects of their teaching, including curriculum design, student assessment, and interactions between faculty and learners. AIM: The following tips outline an approach to facilitating learning of our current generation of medical trainees. METHOD: The method is based on the available literature and the authors' experiences with Millennial Learners in medical training. RESULTS: The 12 tips provide detailed approaches and specific strategies for understanding and engaging Millennial Learners and enhancing their learning. CONCLUSION: With an increased understanding of the characteristics of the current generation of medical trainees, faculty will be better able to facilitate learning and optimize interactions with Millennial Learners.

<https://www.ncbi.nlm.nih.gov/pubmed/22288944>

Multitasking

Junco R. In-class multitasking and academic performance. *Comput Hum Behav* 2012;28(6):2236-2243.

The omnipresence of student-owned information and communication technologies (ICTs) in today's college classrooms presents educational opportunities but can also create learning problems. Specifically, multitasking with these technologies can interfere with the learning process. Indeed, research in cognitive science shows that there are clear performance decrements when trying to attend to two tasks at the same time. This study examines the

frequency with which students multitask during class using a large sample (N = 1,839) and examines the relationship between multitasking and academic performance as measured by actual overall semester grade point average (GPA). Students reported frequently text messaging during class but reported multitasking with other ICTs to a lesser extent. Furthermore, only social technologies (Facebook and text messaging) were negatively related to GPA. <https://www.sciencedirect.com/science/article/pii/S0747563212001926>

Ophir E, Nass C, Wagner AD. Cognitive control in media multitaskers. *Proc Natl Acad Sci U S A* 106(37): 15583-15587.

Chronic media multitasking is quickly becoming ubiquitous, although processing multiple incoming streams of information is considered a challenge for human cognition. A series of experiments addressed whether there are systematic differences in information processing styles between chronically heavy and light media multitaskers. A trait media multitasking index was developed to identify groups of heavy and light media multitaskers. These two groups were then compared along established cognitive control dimensions. Results showed that heavy media multitaskers are more susceptible to interference from irrelevant environmental stimuli and from irrelevant representations in memory. This led to the surprising result that heavy media multitaskers performed worse on a test of task-switching ability, likely due to reduced ability to filter out interference from the irrelevant task set. These results demonstrate that media multitasking, a rapidly growing societal trend, is associated with a distinct approach to fundamental information processing. <http://www.pnas.org/cgi/doi/10.1073/pnas.0903620106>

Ophir E, Nass C. Test how fast you juggle tasks. *The New York Times*. [Published 2010 June 6]. Available from: <https://archive.nytimes.com/www.nytimes.com/interactive/2010/06/07/technology/20100607-distraction-filtering-demo.html>.

Ophir E, Nass C. Test your focus. *The New York Times*. [Published 2010 June 6]. Available from: <https://archive.nytimes.com/www.nytimes.com/interactive/2010/06/07/technology/20100607-distraction-filtering-demo.html>.

Rosen LD, Carrier M, Cheever NA. Facebook and texting made me do it: Media-induced task-switching while studying. *Comput Hum Behav* 2013;29(3):948-958.

Electronic communication is emotionally gratifying, but how do such technological distractions impact academic learning? The current study observed 263 middle school, high school and university students studying for 15 min in their homes. Observers noted technologies present and computer windows open in the learning environment prior to studying plus a minute-by-minute assessment of on-task behavior, off-task technology use and open computer windows during studying. A questionnaire assessed study strategies, task-switching preference, technology attitudes, media usage, monthly texting and phone calling, social networking use and grade point average (GPA). Participants averaged less than six minutes on task prior to switching most often due to technological distractions including social media, texting and preference for task-switching. Having a positive attitude toward technology did not affect being on-task during studying. However, those who preferred to task-switch had more distracting technologies available and were more likely to be off-task than others. Also, those who accessed Facebook had lower GPAs than those who avoided it. Finally, students with relatively high use of study strategies were more likely to stay on-task than other students. The educational implications include allowing students short “technology breaks” to reduce distractions and teach students metacognitive strategies regarding when interruptions negatively impact learning. <https://www.sciencedirect.com/science/article/pii/S0747563212003305>

Sana F, Weston T, Cepeda NJ. Laptop multitasking hinders classroom learning for both users and nearby peers. *Comput Educ* 2013;62:24-31.

Laptops are commonplace in university classrooms. In light of cognitive psychology theory on costs associated with multitasking, we examined the effects of in-class laptop use on student learning in a simulated classroom. We found that participants who multitasked on a laptop during a lecture scored lower on a test compared to those who did not multitask, and participants who were in direct view of a multitasking peer scored lower on a test compared to those who were not. The results demonstrate that multitasking on a laptop poses a significant distraction to both users and fellow students and can be detrimental to comprehension of lecture content.

<http://www.sciencedirect.com/science/article/pii/S0360131512002254>