Proposal for a Collaborative Approach to Clinical Teaching

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Evidence suggests that inexperienced clinical teachers are often controlling and noninteractive. Adult learning theory states that mature students prefer shared and self-directed learning and that skillful teachers favor facilitating discussions over transmitting knowledge. Similarly, education research shows that effective clinical teachers invest in relationships with learners, ask questions to diagnose learners, communicate complex information clearly, and provide meaningful feedback. On the basis of these principles, we propose a collaborative approach to clinical teaching that has 4 essential components: (1) establish a relationship with the learner, (2) diagnose the learner, (3) use teaching frameworks that engage learners, and (4) develop teaching scripts and a personal philosophy. This article includes suggestions for creating a positive learning climate, asking higher-order questions, providing meaningful feedback, and developing teaching scripts. We believe that practicing this approach, which emphasizes respectful teacher-learner relationships, improves the quality of every clinical teaching encounter.

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Relationships between clinical teachers and students are created by learning medicine and serving patients, so medical education should be founded on a collaborative approach. However, our research showed that teachers rarely use the adult learning principles of encouraging dialogue, asking questions, and giving meaningful feedback.[1] Other studies revealed that inexperienced teachers favor giving presentations over engaging in conversations.[2-4] For example, Collins et al[2] found that clinical teachers often "transfer knowledge to students" and give mini-lectures during rounds, which students view as ineffective teaching. Bazuin and Yonke[3] recognized the need for clinical teachers to stimulate critical thinking in contrast to asking closed-ended questions. Irby[4] reported that ambulatory preceptors' limitations include focusing on patient care at the cost of learning, asking questions to diagnose patients (but not to know learners), and failing to promote discussions.

To understand attributes of expert teachers, we turned to adult learning theory. Knowles et al[5] and Brookfield[6] underscored that adults prefer collaborative and self-directed learning and that successful teachers choose facilitating discussions over transmitting knowledge. Similarly, Palmer[7] distinguished between the objectivist myth, in which knowledge flows downward from experts to amateurs, and the more advanced community of truth, in which teachers and learners pursue knowledge together. Finally, Maslow[8] observed that effective teachers are observant, noncontrolling, and inquisitive.

Characteristics of expert teachers are also illuminated by educational research. A survey of faculty, residents, and students found that excellence in teaching requires enthusiasm and enjoyment of teaching.[9] Irby[10] demonstrated that the best clinical teachers exhibit a genuine interest in students, ask questions frequently, and have the ability to diagnose both patients and learners. Wright et al[11] showed that effective physician role models spend extra time with residents. Our peer observations revealed that experienced teachers engage in dialogues with learners, ask questions skillfully, and acknowledge their own inadequacies.[1]

A theme emerging from adult learning theory and research is that outstanding clinical teachers nurture relationships with learners by treating them as valued colleagues and asking them questions to understand their individual needs. Building on these principles, we propose a collaborative approach to clinical teaching that has 4 essential components: (1) establish a relationship with the learner, (2) diagnose the learner, (3) use teaching frameworks that engage learners, and (4) develop teaching scripts and a personal philosophy.

ESTABLISH A RELATIONSHIP WITH THE LEARNER

Although a comprehensive strategy of relationship building and communication is beyond the scope of this article, we discuss creating a positive learning climate, asking questions, and giving feedback, which are staples of any educator's repertoire.

CREATE A POSITIVE LEARNING CLIMATE

Learning climate is an atmosphere of teaching that is determined by the learner's desire to be present.[12] Although learning climate depends on teachers, learners, and physical setting, teacher behavior plays a crucial role.

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TABLE. **Classification of Questions Based on Bloom's Taxonomy: Definitions and Examples**[a]

Category	Definition	Example
Knowledge	Remembering appropriate information, including specifics, abstractions, and methods	What is your differential diagnosis for chest pain?
Comprehension	The most basic level of understanding, whereby learners know information but have very limited capacity to relate to other information	What is the difference between angina and pleuritic chest pain?
Application	The ability of learners to use abstractions within specific circumstances	What is the clinical significance of exertional chest pain in a 20-year-old woman vs an 80-year-old man?
Analysis	The reduction of information into its essential components, such that the relationship between the components is clear	Why do you believe that your patient has coronary artery disease?
Synthesis	The combination of components to build a whole that was not previously evident	How would you explain the fact that this patient with diabetes and tobacco abuse has experienced worsening exercise tolerance during the past 6 months?
Evaluation	Judgments about the merits of something for a specific intent	Why wouldn't you offer coronary artery bypass surgery to this patient with widely metastatic prostate cancer?

[a] This table was constructed using the classification developed by Bloom et al.[19] The level of sophistication and depth of learner understanding increase with progress from knowledge to evaluation categories. Lower-order questions generally begin with "what," whereas higher-order questions often begin with "how," "why," or "what if." Asking higher-order questions (eg, evaluation) often allows assessment of a learner's entire spectrum of understanding, all the way down to the knowledge category.

We observed the different ways in which novice and experienced teachers greeted their residents before making rounds in the hospital. Novice teachers often focused on patient care. For example, novice teachers may state, "I see the service is very busy. Let's begin on the top floor and work our way down." However, more experienced teachers focused on the residents. For instance, experienced teachers may ask, "How was your night on call? Did you get enough sleep? Did the emergency department treat you well?" In this way, experienced teachers bond with their residents, thereby increasing the team's capacity to handle external challenges. Indeed, research showed that teacher-learner relationships influence motivation and learning.[13,14] Haidet and Stein[15] further observed that these relationships, which are characterized by emotional investment, create the basic context wherein learning occurs.

Therefore, a positive learning climate is necessary but insufficient for learning. That is, brilliant teachers cannot promote learning without establishing good learning climates, and creating good learning climates is inadequate for teachers who lack expertise. Daloz[16] proposed a model of teaching that balances challenge and support. He observed that low challenge and support cause stasis, high support alone causes confirmation, high challenge alone causes fear and retreat, and the combination of high challenge and high support yields growth and development. Similarly, Yerkes and Dodson[17] found that an optimal amount of stress is required for tasks such as learning, yet learning decreases when the optimum stress is exceeded.

Ask Questions

Perhaps the clinical teacher's essential skill is asking questions effectively.[1,10,18] Mastery of questioning assumes the ability to listen, read facial expressions, and adjust questions to the learner's level of understanding. Moreover, a teacher's humility and flexibility are tested when answers are uncertain or learners counter with unanticipated questions.[1]

One system for classifying questions is based on Bloom's taxonomy of educational objectives, which is composed of the following categories: knowledge, comprehension, application, analysis, synthesis, and evaluation (Table).[19] Questions from these categories build on one another and become increasingly complex. For example, lower-order questions elicit knowledge recall (eg, "What are the red-flag symptoms for patients with back pain?"), whereas higher-order questions require interpretation, application, and judgment regarding existing knowledge (eg, "How do you manage patients with chronic back pain?"). Note that lower-order questions are closed-ended and often begin with "what," whereas higher-order questions are open-ended and often begin with "how," "why," or "what if."

The sequence of questions is important. Erratic movement between simple and complex questions often confuses students.[20] Hence, it is effective to follow a general question with probing questions. These probing questions may solicit clarification and supporting evidence or facilitate consensus among 2 or more learners.[20] Similarly, *extending* questions request additional examples along the same plane of complexity, whereas *lifting* questions encourage thinking along a higher level of complexity.[20] Finally, it is tempting to use lower-order questions to assess knowledge (eg, "What is the differential diagnosis for patients with back pain and fever?"); however, higher-order questions (eg, "How would you evaluate this patient's back pain if she had a fever?") allow teachers to simultaneously assess learners' knowledge and clinical decision-making capacity.

Common pitfalls exist regarding the use of questions. First, clinical teachers may ask too few questions or pose numerous questions that masquerade as teacher monologues.[1] Second, teachers sometimes word questions haphazardly or ask double-barreled questions. Third, teachers often provide the answer rather than extend on weak responses with probing questions or elicit responses from other team members to initiate dialogue. Fourth, teachers sometimes fail to give supportive feedback (eg, "You're on the right track"), which is crucial for building confidence. Fifth, teachers may not allow adequate pauses, which should be at least several seconds after a question.[18,21]

To avoid these pitfalls, we recommend the following method: (1) When you are inclined to speak, stop and craft your statement into a question. (2) When posing a question, stop, reflect, word your question clearly, and consider phrasing it as a higher-order question. (3) Ask your question and wait silently for several seconds. (4) Study the learner's response and body language to fashion the next appropriate question.

Give Feedback

Feedback occurs when output is returned to a system to regulate its dynamic function. The concept is rooted in cybernetics,[22] which deals with complex systems and their decisive feedback mechanisms. Wiener[22] writes, "If the information which proceeds backward from the performance is able to change the general method and pattern of performance, we have a process…called learning." Thus, feedback is fundamental to successful clinical teaching.[1,10,12,18,23]

Ende[24] distinguished between feedback, which is formative, and evaluation, which is summative and involves judgment. As gyroscopes continuously guide missiles, so teachers give real-time feedback to direct learners toward an educational objective.

To make the many aspects of feedback easier to remember, we developed the mnemonic FIT and ABLE, described as follows.

Frequent. Give feedback frequently,[23,24] even if it consists only of brief verbal responses (eg, "I agree" or "Perhaps that requires further explanation") and nonverbal cues.

Interactive. Teachers and learners should provide mutual feedback. Additionally, it is useful for learners to openly reflect on their own performances.[23] To facilitate self-reflection, consider using the "double you" statement "How do *you* think *you* did?"

Timely. Give feedback immediately after observing behaviors, ideally within 48 hours.

Appropriate for Learner Level. Make feedback appropriate for the learner's level of competence. A 2nd-year medical student could be expected to obtain a reliable history from a patient with heart failure but not to prescribe diuretic medications and monitor the patient's response to therapy.

Behavior Specific and Balanced. Base feedback on observed behaviors.[18,23,24] Stating "Your bedside manner is cold and insensitive" would be judgmental, but stating "I noticed that you crossed your arms and interrupted the patient while she was asking questions" would be based on observation. Also, people are more receptive to feedback that has both positive and corrective components. "Sandwiching" the corrective feedback between positive components can be very effective (eg, "Your bedside manner is very attentive. But you could improve by using less technical language. Nonetheless, it was apparent that the patient really appreciated your receptiveness to her questions.")

Labeled. Always label your feedback. Most learners understand the importance of feedback, but they may not always understand that your comments represent feedback.

Empathetic. Be sensitive to the social context when giving feedback. A rule of thumb is to compliment in public and correct in private. Sometimes learners are not ready to receive feedback, so giving it may be inappropriate.

DIAGNOSE THE LEARNER

Diagnosing the learner is a process whereby teachers identify deficiencies in students' medical knowledge and skills. Diagnosing the learner naturally follows the previous component of this approach to teaching (ie, establishing a relationship with the learner) because learners will reveal themselves within comfortable relationships and teachers cannot discern a learner's limitations without asking questions. Diagnosing the learner is a crucial step. Just as physicians must diagnose diseases before treating patients, teachers must diagnose learners before improving learners' clinical development and diagnostic reasoning abilities.

Models for diagnosing learners are either analytic (ie, they break up) or synthetic (ie, they put together). One example of an analytic model is termed Knowledge, Skills and Attitudes (KSA). The components of this model, while educationally important, generally do not present an integrated framework for diagnosing learners at progressive stages of growth. However, models described by Pangaro[25] and Bordage[26] provide extremely useful developmental approaches for diagnosing learners when they are presenting cases, either in the clinic or at the bedside.

Pangaro[25,27] observed that medical students progress through 4 stages labeled Reporter, Interpreter, Manager and Educator (RIME). *Reporters* take reliable histories,

perform accurate physical examinations, and effectively communicate the findings to their preceptors. They are also dependable and have good interpersonal skills. Students should master this level by the 3rd or 4th year of medical school. *Interpreters* understand the meaning of patients' problems and prioritize them into differential diagnoses. Students at this level show increased participation in patient care and further integration into the health care team. *Managers* act on their diagnostic impressions by making executive decisions and tailoring plans to a patient's individual needs. *Educators* gain a deeper knowledge of their disciplines from regular self-directed learning. Through reading, students at this level teach their colleagues and assimilate existing evidence to justify their management decisions. Notably, progression through these 4 stages assumes that students have demonstrated adequate competency in the preceding levels.

Bordage's model is used to assess learners' diagnostic thinking. Bordage et al[28-30] showed that clinical reasoning is determined by the organization of knowledge in memory. On the basis of this understanding, Bordage[26] articulated 4 types of discourse organization: reduced, dispersed, elaborated, and compiled. Diagnosing learners' reasoning abilities is accomplished by listening to them think through cases, asking probing questions, and using teaching frameworks (described in the "Use Teaching Frameworks" section) that require commitment to a diagnosis.

According to Bordage's model, learners with *reduced* knowledge present the facts but provide minimal diagnostic impressions. They fail to link a patient's findings with their own knowledge because such knowledge is lacking. *Dispersed*-type learners have abundant knowledge without awareness of context or capacity for application. They describe elaborate histories and physical examinations and give long lists of diagnoses but suggest no working diagnosis, thus missing the forest for the trees. Learners with *elaborated* knowledge use terms that are more abstract than the patient's signs and symptoms. These terms are called *semantic axes*.[26] Examples of semantic axes are *acute* vs *chronic*, *unilateral* vs *bilateral*, and *localized* vs *diffuse*. Using semantic axes, clinicians with elaborated knowledge can weigh likely against unlikely diagnoses, yielding a diagnostic accuracy of about 80%.[30] Learners with *compiled* knowledge immediately recognize patterns and synthesize the clinical data into highly abstract and "compiled" terms (eg, *acute coronary syndrome*). In fact, the diagnostic impression is often so abstract that it needs deciphering for novice physicians to understand its meaning.

Bordage's model describes a spectrum of diagnosticians ranging from weak (reduced and dispersed) to strong (elaborated and compiled), in which stronger diagnosticians are characterized by their abilities to use semantic axes.[26] Fortunately, strategies exist for improving weak diagnosticians. Specifically, learners with reduced or dispersed structures have a tendency toward rote memorization, so they are advised to read about their patients and then reflect. For example, after reading about a patient with angina, the learner should ponder, "How would patients with angina present differently from patients with pulmonary embolism, pneumonia, or aortic dissection?" To resolve this problem, the learner would use semantic axes. Thus, he or she might reflect, "Chest pain from angina or pneumonia would develop more gradually, whereas chest pain from pulmonary embolism or aortic dissection would be acute."

USE TEACHING FRAMEWORKS THAT ENGAGE LEARNERS

Investigators describe teaching frameworks[31,32] that serve to structure learning encounters, incorporate the skills of asking questions and providing feedback, and diagnose learners.

Neher et al[31] described a 5-step "microskills" model of teaching. The first step is *getting a commitment* from residents regarding a diagnosis and plan of care. At this step, teachers ask questions for the express purpose of diagnosing residents, as opposed to learning facts about patients. The second step is *probing for supporting evidence*, which provides additional insight regarding residents' clinical reasoning processes. Here teachers must avoid being threatening, so that residents will feel comfortable thinking aloud and exposing their weaknesses. The third step is *teaching general rules*. The initial steps reveal residents' limitations, thus providing opportunities for teachers to teach general rules. The fourth step is *reinforcing what was done correctly*, and the fifth step is *correcting mistakes*. Clearly, the last 2 steps constitute positive and corrective feedback.

A more recent teaching method, the SNAPPS model, expands on the 5-step microskills model by empowering residents to drive teacher-learner interactions.[32] SNAPPS is an acronym for *summarizing* the history and examination; *narrowing* the differential diagnosis to several possibilities; *analyzing* the differential by comparing and contrasting options; *probing* the preceptor by asking about ambiguities, challenges, and different approaches; *planning* the patient management; and *selecting* a case-specific topic for self-directed learning. This collaborative model is progressive because learners direct questions to their preceptors and identify their own learning needs. Although learners are the driving force in SNAPPS, this

model is most effective when both teachers and learners agree to use it.[32]

DEVELOP TEACHING SCRIPTS AND A PERSONAL PHILOSOPHY

A challenge among experts is to communicate complex knowledge to novices. Those who can do this effectively are teachers; those who cannot are simply experts.

Effective clinical teachers communicate their understanding by using teaching scripts,[10,33] which is instructional knowledge representing a teacher's accumulated experience on topics ranging from pathophysiology to physician-patient communication, that enable learners to connect medical problems to the larger appropriate context. A qualitative study by Irby[10] revealed that distinguished clinical teachers characteristically use teaching scripts, which pertain to specific diseases (illness scripts) and particular types of patients or situations (instance scripts).

Consider this example: A student presents the case of an elderly patient who is taking several medications and has hyponatremia and confusion. The student has never seen a patient with hyponatremia, so the student cannot suggest a cause. In contrast, the attending physician has treated many patients with hyponatremia, so numerous causes for this patient's hyponatremia come to mind (eg, intracranial malignancy, intravascular volume depletion, medication [antidepressant]). Instead of spewing forth these diagnoses, the attending physician describes a diagnostic framework whereby all causes of hyponatremia are categorized on the basis of a patient's volume status and serum osmolality. The teacher then engages the student in an interactive discussion, applying the framework to the current patient and encouraging the student to reach his or her own diagnostic impression.

Suggestions for how teachers might develop and use teaching scripts are as follows: (1) Slow down during teaching interactions and reflect. Beginning teachers may need to grapple with ways to translate their accumulated experience into teachable pearls, but with practice it can be done. (2) Practice teaching scripts whenever the opportunity arises, using different formats (eg, handouts, diagrams, electronic resources) and adjusting the content to different learner levels. (3) Keep a running list of favorite teaching scripts until they become so comfortable that the list becomes internalized and hence unnecessary.

Finally, we recommend developing a personal philosophy of teaching. Teaching is a mirror that reflects our strengths and weaknesses, thus forcing us to reject the dogma on what teachers "should" be and do and to embrace a customized approach. Supporting this, Palmer[7] observed that teachers are genuine when they understand their own "inner landscapes." Therefore, we encourage teachers to periodically meditate on the reasons why they make huge investments in teaching.[34] Through reflection, teachers may refine their teaching styles, integrate motivation with approach, and develop personal philosophies that ultimately become powerful and sustainable "career scripts."

CONCLUSION

Clinical teaching requires intimate teacher-student relationships and synchronized attention to patient care and learning. Furthermore, physicians-in-training are adults who learn best when collaborating with teachers as colleagues. Collaboration is achieved by establishing relationships that are grounded in respectful learning climates, diagnosing learners through observation and skillful questioning, using teaching methods that require active learner participation, developing teaching scripts that communicate complex information to learners, and creating a personal philosophy of teaching. Our experience reveals that this approach enhances faculty development on clinical teaching for senior residents and faculty, which may be consistent with previous studies on curricula for "teaching the teachers."[35-37] We believe that practicing a collaborative approach, which emphasizes respectful teacher-learner relationships, will improve the quality of every clinical teaching encounter.

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