

Questioning as a Teaching Tool

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Questions are a central part of the practice, and teaching, of medicine. Through questioning, we diagnose patients, reflect upon our own practice, assess learners, and teach. This article provides an approach to questioning for the purposes of student assessment and teaching by considering the Dreyfus and Bloom frameworks. The authors offer practical ways to use questions to diagnose students' understanding, to teach, and to model life-long learning.

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This article is part of the Council on Medical Student Education in Pediatrics series on strategies and techniques used by great clinical teachers. Herein we explore how educators can best use questioning strategies to promote learning in the clinical setting. Teachers commonly ask questions to assess learners' knowledge.^{1,2} When used strategically, questioning can engage learners by stimulating active participation in the learning process, guide them toward the understanding of deeper concepts, promote peer-peer collaboration, and build their confidence.¹ Moreover, through questioning, clinicians can stimulate critical thinking while actively modeling the process of inquiry and life-long learning.¹

Questioning is a challenging teaching tool and even experienced, well-meaning educators occasionally make mistakes. Teachers often rely heavily on recall-based questions that fail to stimulate deeper thinking and can cause learners to disengage.^{3,4} Questions that are mismatched to learner level can be equally

problematic; asking novice learners unrealistically challenging questions can lead them to lose self-confidence and interest and asking advanced learners fact-based questions can demotivate them. Finally, questions posed in a seemingly confrontational manner (which can cause anxiety in learners and may be perceived as "pimping") can adversely affect the learning climate.^{1,5} We provide a framework for matching questions to a learner's ability and provide suggestions for formulating questions to both challenge learners and maintain a supportive learning environment.

CONSTRUCTING QUESTIONS BASED ON LEARNER ABILITY

Different learners and teaching situations require different types of questions. One approach to effective questioning takes into consideration the developmental stage of the learner and the learning objectives best suited for the stage.

The educator first classifies the developmental stage of the learner based on his or her competence, confidence, and motivation by using the Dreyfus model of skills acquisition.⁶ The 4 Dreyfus stages most relevant to clinical educators are novice (learners function by using a limited rule-based knowledge system without a clinical context), advanced beginner (learners have an expanded repertoire of clinical rules and may just be getting exposed to a clinical environment), competent (learners use rules of thumb and are in the process of getting invested in the actual care of their patients), and proficient (learners show increasing initiative in patient

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care and use intuitive clinical reasoning based on their previously gained clinical experience).⁶ Generally, most students will be in the novice to advanced beginner stage, whereas most residents will be in the advanced beginner to competent stage. Some residents and many fellows may be in the proficient phase, but few are likely to be at the higher stages of expert or master and these stages are not addressed in this article.⁶ These generalizations can break down for some trainees (such as a particularly experienced medical student) and in some situations (such as a senior resident encountering a patient with a specific or rare disease for the first time). Therefore, getting to know your learner by asking about their background and experiences and probing their knowledge base is very important.⁷

The next step is to think about the type of question to ask, by matching the assessed developmental level of the learner to the learning objectives for that stage of learner.^{1,2,8} One framework for formulating specific questions matched to each of the learner levels uses Bloom's taxonomy.^{1,2,6,8} Bloom's taxonomy is a hierarchy widely used by educators that places thinking skills at 6 levels: knowledge (lowest level), comprehension, application, analysis, synthesis, and evaluation (highest

level).^{2,8} The most relevant to clinical questioning of students and residents are the levels from knowledge to analysis. Due to limited clinical experience, novice learners benefit most from simple questions focused on factual knowledge.¹ These questions are often phrased in a direct manner and have a single best answer. Advanced beginner learners are working on linking facts they may have learned in isolation, so questions should prompt them to connect information and demonstrate understanding of concepts and comprehension. Competent and proficient learners are applying information to common clinical situations, so questions can be more complex and prompt them to apply theoretical knowledge to a specific clinical situation in the decision-making process. Learners can be asked to analyze a situation or to compare and contrast 2 or more options for managing a patient's medical issues. Questions may also pose alternatives to what the learner proposed, followed by an exploration of their thought process. Specific examples of questions using the Bloom framework matched to developmental stage (Dreyfus) are listed in Table 1.

Although fact-based questions are good for building confidence and assessing knowledge, especially for novice learners, clinical teachers

should avoid the common pitfall of relying on "low level" questions promoting rote memorization without true understanding of concepts.^{1,3,4} Even with novice learners, one can use a step-up approach and ask increasingly complex follow-up questions to simultaneously engage and challenge learners and create "constructive friction,"⁹ provided questioning does not become too challenging or intimidating.² For more advanced learners, questioning can start at a higher level and be open-ended, with a step-down to simpler questions if learners struggle finding answers.² In groups or with multiple levels of learners, such as on ward rounds, it is often easiest to begin the questioning process directed toward the primary learner taking care of the patient. However, remember to keep the group engaged by asking questions of all or several of the team members, matched to their developmental level.²

QUESTIONING WHILE MAINTAINING A POSITIVE LEARNING ENVIRONMENT

Although questioning inherently puts the learner "on-the-spot," it is possible to minimize discomfort while promoting a positive learning environment. First, set the expectation with learners that you will be asking questions. Explain that your goal is to explore their

TABLE 1 Asking Questions Based on Learner Developmental Level

Developmental Stage of Learner (Dreyfus)	Objectives for Questions to Focus on (Bloom)	Goal of Questioning	Stems to Consider Using	Sample Question(s): Based on a Patient With a Possible Urinary Tract Infection
Novice	Knowledge	Build knowledge	List Define Name	List the 3 ways a specimen can be obtained for urine culture. What are the diagnostic criteria for a urinary tract infection?
Advanced beginner	Comprehension	Promote understanding of concepts	Explain Describe	Explain why a urine culture is indicated in a febrile infant.
Competent	Application	Stimulate application of knowledge to a clinical context	Interpret	Here is our patient's urinalysis ... what do you think this tells us and why (or interpret these results)?
Proficient	Analysis	Break down complex concepts into their component parts	Compare and Contrast	Compare and contrast the need for a urine culture in a febrile male infant and a febrile female teenager, both without localizing signs and symptoms.

understanding and build upon what they already know.^{1,2}

Great clinical teachers pay particular attention to how questions are asked. They avoid asking questions in a rapid-fire sequence, and instead ask questions one at a time. Allowing learners between 3 and 5 seconds to respond with an answer has been shown to increase both the likelihood of getting a response and also the length of the response.^{2,10}

Importantly, avoid interrupting learners while they are formulating a response and wait after receiving a response before asking a follow-up question.¹

To further promote a positive learning environment, teachers can ask open-ended questions that increase the chance of their learner being able to find an acceptable answer, on which they can then elaborate (“Can you explain to the team your thought process?”).¹¹ The teacher can also restate the learner’s answer to confirm respect for his or her thoughts (“You’ve brought up a good point ...”). In a group setting, directing questions to other learners on the team can simultaneously reduce the pressure on the learner who is presenting information and engage others in learning. Getting a commitment on the same question from all learners before revealing the answer is another way to involve the entire team in the learning process. Finally, resist the temptation to provide answers to all of the learners’ questions; challenge learners to research the question and report back.

If the learner’s response to a question seems noncommittal or is incorrect, guide them while maintaining

confidence in their abilities, especially in front of patients. As alluded to earlier, this is another time when open-ended brief clarifying questions can be asked instead of answering the question or turning to others (“Can you tell us more about that?”).^{1,11} Similarly, when a learner is initially incorrect, guiding them to the correct answer by using a gentle approach is a way to challenge learners without humiliating them (“That’s an interesting thought. If that was the diagnosis, how would you explain the absence of...?”).¹²

Lastly, if the opportunity arises, think about asking the learners themselves to generate and pose questions to the team, to further engage them. These can then be researched individually or as a group and discussed the next time the team comes together.

SUMMARY

The Dreyfus and Bloom frameworks can help the great clinical teacher craft questions that are learner-centric and appropriately challenging. Employing strategies to ask the right questions in the right way can further add to the effectiveness of using questions as a valuable teaching, learning, and assessment tool.

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