Four-Tiered Question Goals

TEFA questions are most effective when designed to achieve teaching goals on four different levels

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Questions for students to digest, wrestle with, answer, discuss, and reflect upon are central to the *Technology-Enhanced Formative Assessment* (TEFA) pedagogical approach; one of TEFA's core tenets is *question-driven instruction* (QDI).[1] The nature and quality of the questions used has a dramatic impact on student learning.

TEFA questions can impact students on four distinctly different levels. In fact, they *will* impact students on these four levels whether or not we intend them to. In order to make sure that the impact is desirable and maximally effective, it behooves us to explicitly consider all four when we design questions. Ideally, we should have a four-tiered goal for each question. (Realistically, it is not always possible to put so much care into every question. Nevertheless, keeping the four tiers in mind is beneficial.)

The first level of question design goal is the **content goal**, which answers the question "What should be taught?" That is, what piece(s) of subject content will the question focus students' attention on? As discussed in *TEFA Note #3* ("TEFA Question Content"), a good bet is to target core concepts, organizing principles and models, and other "big ideas" of the subject: widely applicable pieces that help students make sense of other pieces and see the big picture.

The second level of question

Practical Advice

Trying to design every TEFA question to address all four tiers of instructional goal can be daunting. In practice, we find that as teachers master TEFA, they gradually make the four-tier more and more of a part of their thinking. This is an iterative process, whereby the teacher returns every so often to the "four goal levels" and challenges herself or himself to use it more thoroughly. Eventually, the perspective is internalized as a part of how one naturally thinks about questions. For example, a question that sends bad meta-messages just feels "wrong."

One way of applying the idea is to start with the evidence: compare what you see in your students' behavior and achievement with what you'd like to see, and then ask how closing this "gap" might be phrased in terms of question design goals. Create new questions accordingly.

A general piece of advice is to think about a question's *effect* more than what it is *about*. How will it impact students? How, exactly, should there un-

design goal is the **cognitive process goal**, which answers the question "How should the question be thought about?" Whenever students think about a question, they exercise some specific thinking skills. Experts in a scientific discipline regularly use several different mental processes; facility with these is an essential component of expertise. We call them *beneficial habits of mind*.[2]

Students need opportunities to form and practice these habits of mind. TEFA questions can be designed so that students exercise specific habits of mind in the process of interpreting, answering, and discussing them. (A forthcoming *TEFA Note* will discuss twelve fundamental habits of mind and how TEFA questions can target them.)

The third level of question design goal is the **conceptual development goal**, which answers the question "What should be learned?" We phrase it this way to focus on how students are guided to integrate new knowledge into their existing mental structures. Knowledge is not simply absorbed as ready-to-use chunks; robust learning requires several *stages of conceptual development*, in which early and nebulous ideas are refined, connected, and structured to support flexible, expert-like thinking.

We can identify five such stages: exploring, defining, and honing concepts; linking and clustering concepts, operations, and procedures; developing analysis and reasoning skills; organizing, prioritizing, and structuring knowledge; and developing concept-based problem-solving skills and strategies.[2] Each TEFA question should target a particular stage of conceptual development, appropriate to where students are on their learning trajectory for the content goal identified. Typically, a series of TEFA questions over multiple days will shepherd students through the various stages while drawing in multiple related content goals. (Designing questions to target stages of conceptual development will be the topic of a subsequent *TEFA Note*.)

The fourth level of question design goal is the **metacognitive goal**, which answers the question "How should answering and learning be framed?" Every TEFA question and everything that transpires in a classroom sends explicit or implicit meta-messages about the nature of the subject, the nature of science or mathematics in general, the goals of instruction, expectations for student behavior, the roles students and teachers should play, how learning happens, and the like.

Students enter our classrooms with deeply held perspectives on all of these points, established through years of school experience. If we want to alter these beliefs — for example, to convince them that their objective during whole-class discussions should be to externalize their thinking and contrast it with other thinking, rather than to

derstanding be different, and what kind of thinking should they do when answering it, and what moral(s) would you like them to take from it?

guess what the teacher wants to hear — we must be very clear and very consistent in the meta-messages we send and in the way we frame classroom activity.

TEFA questions convey meta-messages through their construction, presentation, and handling in class. We can choose the meta-messages we wish to send, and design accordingly; the alternative is to risk sending counterproductive messages that undermine our own efforts.

TEFA questions that can address all four levels of goal simultaneously are "killer questions" that can powerfully impact students and help us achieve our instructional aims.

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[1] See TEFA Note #01, *What is TEFA?*

[2] Robert J. Dufresne, William J. Gerace, Jose P. Mestre, William J. Leonard (2000), *ASK-IT/A2L: Assessing Student Knowledge with Instructional Technology*. UMPERG technical report Dufresne-2000aia.

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