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What Makes Great Teachers Great?

By KEN BAIN

When Ralph Lynn retired as a professor of history at Baylor University in 1974, dozens of his former students paid him tribute. One student, Ann Richards, who became the governor of Texas in 1991, wrote that Lynn's classes were like "magical tours into the great minds and movements of history." Another student, Hal Wingo, an editor of *People* magazine, concluded that Lynn offered the best argument he knew for human cloning. "Nothing would give me more hope for the future," the editor explained, "than to think that Ralph Lynn, in all his wisdom and wit, will be around educating new generations from here to eternity."

What did Lynn do to have such a sustained and substantial influence on the intellectual and moral development of his students? What do any of the best professors do to encourage students to achieve remarkable learning results?

I and several colleagues from the Searle Center for Teaching Excellence at Northwestern University studied more than 60 professors from various disciplines to try to determine what outstanding teachers do inside and outside their classrooms that might explain their accomplishments. And when we examined in particular how good teachers conduct class, we found that they follow several common principles. Specifically, they:

Create a natural critical learning environment. "Natural" because what matters most is for students to tackle questions and tasks that they *naturally* find of interest, make decisions, defend their choices, sometimes come up short, receive feedback on their efforts, and try again. "Critical" because by thinking critically, students learn to reason from evidence and to examine the quality of their reasoning, to make improvements while thinking, and to ask probing and insightful questions. This is, by far, the most important principle -- the one on which all others are based and which commands the greatest explanation.

Some teachers create a natural critical learning environment within lectures; others, with discussions; and still others, with case studies, role-playing, fieldwork, or a variety of other techniques. The method of choice depends on many factors, including the course's objectives, the personalities and cultures of the teachers and students, and the learning habits of both. But an intriguing question or problem is the first of five essential elements that make up a good learning environment.

Often the most successful questions are highly provocative: What would you do if you came home from college and found your father dead and your mother married to your uncle, and the ghost of your father appeared saying that he had been murdered? Why did some societies get in boats and go bother other people, while others stayed at home and tended to their own affairs? Why are some people poor and other people rich? What is the chemistry of life? Can people improve their basic intelligence?

The second important element is guidance in helping students understand the significance of the question. Several years ago, we asked Robert Solomon, a philosophy and business professor from the

University of Texas, to talk about his teaching to a group of faculty members. Solomon called his talk "Who Killed Socrates?" and in that title captured much of the intellectual energy of his inquiry into Socratic pedagogy and why it isn't used much anymore. When we watched Solomon conduct an introductory philosophy class on epistemology, he simply stood before the freshmen and sophomores, looked them in the eye, and asked, "Does anyone here know anything for sure?" The way he asked the question gave it meaning. As students cast about for a positive answer, reeling in one solution and then another, they began to grasp the purpose of this modern inquiry. Once that happened, their learning could begin.

Many teachers never raise questions; they simply give students answers. If they do tackle intellectual problems, they often focus only on their subject and the issues that animate the most sophisticated scholarship in the field. In contrast, the best teachers tend to embed the discipline's issues in broader concerns, often taking an interdisciplinary approach.

When Dudley Herschbach teaches chemistry at Harvard University, he does so with a combination of science, history, and poetry, telling stories about human quests to understand the mysteries of nature. The lesson on polymers becomes the story of how the development of nylons influenced the outcome of World War II. He even asks his chemistry students to write poetry while they struggle to comprehend the concepts and ideas that scientists have developed.

Good teachers remind students how the current question relates to some larger issue that already interests them. When Solomon taught an advanced undergraduate course in existentialism, he began with a story about life under Nazi rule in occupied France in the early 1940s, reminding students that even ordinary activities like whispering to a friend could have had dire consequences in that police state.

Third, the natural critical learning environment engages students in some higher-order intellectual activity: encouraging them to compare, apply, evaluate, analyze, and synthesize, but never only to listen and remember. "I want the students to feel like they have invented calculus and that only some accident of birth kept them from beating Newton to the punch," Donald Saari, a mathematics professor at the University of California at Irvine, told us. Unlike so many in his discipline, he does not simply perform calculus in front of the students; rather, he raises the questions that will help them reason through the process, to see the nature of the questions, and to think about how to answer them.

A fourth aspect of a good learning environment is that it helps students themselves answer the question. The professors we studied often raised important inquiries but challenged students to develop their own explanations and defend them. And finally, a good learning environment leaves students wondering: "What's the next question?" and "What can we ask now?"

In the 1990s, the Institute for the Learning Sciences at Northwestern began working with several professors to develop highly interactive multimedia programs that tried to create this natural critical environment. For example, Larry Silver, a professor of art history at the University of Pennsylvania, has developed software called "Is It a Rembrandt?," which engages each student in becoming a museum's top art investigator and determining the authenticity of three of Rembrandt's paintings. To do so, the students must examine the paintings and build a case to support their conclusions. They can inspect each piece of art, compare it to similar works, view the curator's files, or go to the conservation lab. At each turn, they encounter questions, but they decide which ones to pursue, picking their own path through the material. When, for example, the students have been drawn into a close examination of the brushwork on the face of the painting *Old Man With a Gorget*, they can ask whether Rembrandt's students also mixed brushwork styles in their paintings. If they do, Professor Silver appears on the screen to tell them about "bravura display," and the students can then ask, "What is bravura brush stroke?"

Slowly, the students build their understanding of the art world in which Rembrandt worked and of the critics, collectors, scholars, and controversies that have emerged over the years around the work of the Dutch master, his students, and his imitators. They build a vocabulary for thinking about various issues, an understanding of technical details and procedures, and an ability to use a vast array of historical facts. In short, they learn to think like a good art historian, to appreciate the questions that the discipline pursues, to frame important questions of their own, and to determine the kinds of evidence that might help resolve controversies.

Gerald Mead, a professor emeritus of French at Northwestern, developed a similar program for his course on the history of modern France called "Invitation to a Revolution," which invites students to travel to the late 18th century to see if they can avoid the excesses of the French Revolution. In Deborah Brown's physics course students can use a program that challenges them to build an elevator. In Jean Goodwin's course on free speech, students can act as Supreme Court justices to decide a tricky actual case that asks whether people can be held legally responsible for the long-range consequences of their speech.

We saw the same kind of learning environments created in classes that used simulations, case studies, problems, fieldwork, and even lectures. We saw them when Chad Richardson's students in sociology at the University of Texas-Pan American did ethnographic research on their own cultures, and when Charlie Cannon's landscape-architecture students at the Rhode Island School of Design struggled with how to treat pollution in New York Harbor. Edward Muir, a professor of Italian Renaissance history at Northwestern, recreates trials from that era to help students develop an understanding of the period and how to use evidence to draw historical conclusions. The mathematician Donald Saari takes a roll of toilet paper into class, asks students how they will calculate its volume, then nudges them toward breaking that problem into its simplest components. Jeanette Norden, a professor of cell and developmental biology at Vanderbilt University Medical Center, confronts her students with actual people who have suffered some malady, challenging the future physicians to think through real cases.

We found no great teachers who relied solely on lectures -- not even highly gifted ones -- but we did find people whose lectures were highly interactive and helped students learn because they raised questions and won students' attention to those issues. Many professors organize the class into small groups and charge them with working collaboratively outside of class to confront the intellectual problems of the course. With some topics they might give students a written "lecture" to read in class, asking them to identify its central arguments and conclusions. Because students can read in 15 minutes what it takes 50 minutes to say in a lecture, they could then gather in their groups to discuss the material for another 15 minutes. In the final 20 minutes the instructor can entertain questions, clarify misunderstandings, and suggest how students can learn more.

In all these examples, students encounter safe yet challenging conditions in which they can try, fail, receive feedback, and try again without facing a summary evaluation.

Get students' attention and keep it. Teaching is, "above all, about commanding attention and holding it," Michael Sandel, a Harvard political theorist, has said. "Our task is not unlike that of a commercial for a soft drink or any other product." The only difference, he continued, is that "we want to grasp students and direct their attention someplace else." Teachers succeed in grabbing students' attention by beginning a lecture with a provocative question or problem that raises issues in ways that students had never thought about before, or by using stimulating case studies or goal-based scenarios.

Start with the students rather than the discipline. Every year more than 700 students crowd into Sandel's classroom at Harvard to take his course on justice, in which he asks them to imagine the following scenario: You are the driver of a runaway trolley car that is approaching five men who are

working on the track. You cannot stop the train, and it seems destined to run over the men and kill them. As you speed down the track toward this waiting tragedy, you notice a side track where you can steer the trolley car if you choose to do so. The only problem is that one man is working on that track and the train will undoubtedly kill him if it goes that way. What would you choose to do, he asks the students? Do you turn the car onto the side track, killing one person but saving five others? What would be most just and why? Often the students have no difficulty deciding that they would take out the one life to save the five others.

Sandel then introduces a wrinkle to the story. Suppose, he says, that you are not on the train but standing on an overpass watching it speed toward the five workers. As you watch this disaster in the making, you notice a large man standing next to you, also peering over the railing of the overpass. You quickly calculate that if you push this person over the railing, he will land on the track in front of the train. He will die, but his body will stop the train, saving five lives. Would it be just to give that person a shove?

In that exercise Sandel hopes to provoke students to think about fundamental issues of justice and understand their own thinking in relationship to that of some of the major philosophers. Throughout the course, he then embeds all the major philosophical schools and writers he wishes to consider in contemporary ideological battles intended to excite the students. His knowledge of the history of ideas helps him select the proper passage from Mills or Kant; his knowledge of and concern for the students help him select the political, social, and moral debates that will engage them. Equally important, he constantly changes the issues to fit new generations of students.

Most customary instruction follows an organization that stems wholly from the discipline, a set of topics and subjects that need to be covered. But many of the best teachers make a deliberate and carefully measured effort to confront some paradigm or mental model that students are likely to bring with them to class.

This idea of beginning where the students are rather than where disciplinary traditions might dictate has another influence on practices in the classroom: It leads to explanations that start with the simple and move toward the more complex. "If students have an understanding that is down here," Jeanette Norden explained, putting her hand close to the floor, "you don't start with something up here. Some medical students come in not even knowing what a neuron is -- a neuron is a cell in the brain -- so you have to begin with that simple notion and then you can build from there quickly."

Seek commitments. "I tell my students the first day of class that the decision to take the class is the decision to attend the class every time it meets," one professor explained. "I also tell them that my decision to teach the class includes the commitment to offer sessions worth attending, and I ask them to let me know if they think I'm not doing that."

Highly effective teachers approach each class as if they expect students to listen, think, and respond. That expectation appears in scores of little habits: the eye contact they make, the enthusiasm in their voice, the willingness to call on students. It contrasts sharply with professors who seldom if ever look at their students, who continue on in some set piece almost as if they do not expect students to listen, and who never try to generate a discussion or ask for a response because they don't expect anyone to have any.

Help students learn outside of class. The best professors do in class what they think will best help their students to learn outside of class, between one meeting and the next. That approach is different from deciding to do something simply because it "covers" some subject, but it might lead to a variety of orthodox approaches: a demonstration that both confronts existing notions and provokes confrontation with new ones; a debate that enables students to practice critical thinking and to realize gaps in their own

understanding and reasoning abilities; group work that asks students to grapple together and helps build a sense of community.

Because the best teachers plan their courses backward, deciding what students should be able to do by the end of the semester, they map a series of intellectual developments through the course, with the goal of encouraging students to learn on their own, engaging them in deep thinking. In ordinary classes, instructors might create assignments for students, but they rarely use the class to help students do the work.

Engage students in disciplinary thinking. The most effective teachers use class time to help students think about information and ideas the way scholars in the discipline do. They think about their own thinking and make students explicitly aware of that process, constantly prodding them to do the same.

Through such an approach teachers help students build an understanding of concepts rather than simply perform their discipline in front of them. While others argue that students must learn (memorize?) information first and use reasoning only later, the professors we studied assume that learning facts can occur only when students are simultaneously engaged in reasoning about those facts.

In class, they might engage students in a highly interactive "lecture" in which they present a problem and coax students into identifying the kinds of evidence they would need to consider to solve that problem and how that evidence might be gathered: "Here's the evidence we've encountered thus far; what do you make of it? What problems do you see? What questions would you ask about this evidence? What evidence do we need to answer those questions, and how will we find or collect that evidence?"

Create diverse learning experiences. "The brain loves diversity," Jeanette Norden told us repeatedly. To feed that appetite, she and other outstanding teachers conducted class in a multitude of ways. Sometimes they offered visual information (pictures, diagrams, flowcharts, timelines, films, or demonstrations); other times, auditory input (speech or visual symbols of auditory information -- written words and mathematical notations). Some material was organized inductively, from facts, data, and experimentation to the general principles; other things, deductively, by applying principles to specific situations. The teachers gave students an opportunity to learn sequentially, a piece at a time; they also gave them space to learn globally, through sudden insights. Some of the learning involved repetition and familiar methods; some, innovation and surprises. The very best teachers offered a balance of the systematic and the messy.

In sum, no one achieves great teaching with only vigorous vocal tones, a powerful microphone, good posture, strong eye contact, and honorable intentions. Great teachers are not just great speakers or discussion leaders; they are, more fundamentally, special kinds of scholars and thinkers, leading intellectual lives that focus on learning, both theirs and their students'. They focus on the nature and process of learning, rather than the performance of the instructor.

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