Considerations for Flipping the Classroom in Medical Education

To the Editor: In a recent commentary, Prober and Khan\textsuperscript{1} suggest that delivering a core curriculum during the didactic phase of medical education through a series of 10-minute video presentations coupled with discussion and optional “deep dives” would be an effective and novel approach to medical education. Though well intentioned, their ideas may weaken our system of medical education.

Medical education is a wonderfully complex combination of facts, ideas, and the art of effectively presenting challenging information. An important component of student learning is building the knowledge necessary to distill and then correctly apply this information in an often chaotic and unstructured environment. I am aware of no evidence that critically important learning skills can be developed by presenting students with a curated set of “lecturettes” that are available in a “just-in-time” learning environment. Though the authors highlight the importance of discussion and other forms of interactive learning, reducing the opportunity for students to establish a framework, integrate course content, and then apply this content to problem solving may be counter to effective education.

Prober and Khan suggest that a medical student would benefit from the same “flipped classroom” educational methods being used in grade school. Research has shown, however, that adult learners are more self-directed in their learning,\textsuperscript{3} they have established a problem-centered rather than subject-centered orientation to learning,\textsuperscript{2} and they have an increased ability to integrate large amounts of information into their existing knowledge base when compared with young children. It is likely that the optimum methods and assumptions for teaching elementary school students are quite different from those for instructing medical students.

Prober and Khan acknowledge that “the current system of medical education has resulted in the training of a superb workforce of physicians,” yet they argue that the system needs to be revamped.

Any major changes in methods of instruction, however, should be evidence based. The authors’ statements that

\begin{itemize}
  \item “the net effect of [innovations in teaching strategies] on the way we educate physicians has been limited,”
  \item “the introduction to a life of medical education often is not … compelling,”
  \item “much of what [medical students] will be taught … will prove to be wrong,” and
  \item the current system of medical education is “inflexible and not sensitive to the skills and aspirations of individual learners”
\end{itemize}

are broad generalizations that are not supported by evidence.

It is admirable to challenge the status quo of medical education, but it is essential that any change will enhance value. The mere existence of technology or free content without evidence that these add value should not be the catalyst for reimagining education.

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Harry Goldberg, PhD
Assistant dean, Johns Hopkins School of Medicine, director, Academic Computing, and faculty, Biomedical Engineering, Johns Hopkins University, Baltimore, Maryland; goldberg@jhmi.edu.

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To the Editor: In their recent commentary, Prober and Khan\textsuperscript{1} proposed a flipped-classroom model to build a framework of core knowledge in medical education, embedding that knowledge through richly interactive, compelling, and engaging formats. Although the idea of “flipping the classroom” is well established, medical education with its yearlong preclinical courses, clinical courses of various lengths, hundreds of instructors, and interdisciplinary curriculum is not necessarily as conducive to this educational model as undergraduate courses in other disciplines. Flipping the classroom in medical education requires a change management approach similar to the educational program quality improvement template described by Chandran and colleagues.\textsuperscript{2}

Chandran and colleagues’ proposed process, inspired by Kotter’s\textsuperscript{3} change management model, “engaged students, revitalized faculty, and enabled significant, positive institutional transformation.” Kotter’s model has proven to be successful for creating permanent positive organizational change. It includes putting together a guiding coalition with enough power to lead the change, developing a change vision, and using increased credibility to change systems, structures, and policies that do not fit the vision. In medical education this may include enterprise-wide systems, student support structures, and intellectual property policies. In the winter of 2013, the Ohio University Heritage College of Osteopathic Medicine piloted a flipped-classroom approach to the second-year Endocrine and Metabolism course. Postcourse student evaluations identified an appreciation for the type of positive institutional transformation that would support flipped classrooms across the continuum. For example, students expressed a preference for a single system for recording lectures as well as prerecording lectures.

Medical education across the continuum is in an unprecedented era of change. Flipping the classroom holds promise to enable richer educational experiences as well as the flexibility of encouraging in-depth pursuit of knowledge in some, but not all, domains. Academic leaders would be wise to view this as a significant curricular movement that requires a change management effort.

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Larry Hurtubise, MA
Assistant professor of family medicine and faculty development educational technologist, Ohio University Heritage College of Osteopathic Medicine, Athens, Ohio; hurtubis@ohio.edu.
Theresa K. Lester, MA
Accreditation and program analyst, Office of Institutional Assessment and Planning, Ohio University Heritage College of Osteopathic Medicine, Athens, Ohio.

Shigeru Okada, PhD
Assistant professor of pediatrics, Department of Pediatrics, and instructor of record for the second-year Endocrine and Metabolism course, Ohio University Heritage College of Osteopathic Medicine, Athens, Ohio.

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In Reply to Goldberg and to Hurtubise et al: I appreciate the specific issues raised by Dr. Goldberg and by Dr. Hurtubise et al. Dr. Goldberg correctly implies that there is a lack of definitive data supporting an optimal teaching strategy. There is, however, increasing literature regarding the effectiveness of hybrid learning models. A meta-analysis published by the U.S. Department of Education concluded that “on average, students in online learning conditions performed modestly better than those receiving face-to-face instruction” with larger effects if the online learning was blended with face-to-face instruction.1 Former Princeton President William Bowen and the nonprofit organization ITHAKA have published studies demonstrating the effectiveness of a combination of online and in-class instruction in learning outcomes with fewer hours of study than traditional in-class instruction.2

Dr. Goldberg expresses concern that “reducing the opportunity … to establish a framework, integrate course content, and then apply this content to problem solving may be counter to effective education.”3 I agree. Our proposed model is specifically designed to integrate course content, delivered in digestible doses (e.g., as short videos), before engaging the students in the critical, interactive application exercises. This is aimed to ensure that the relevance of the facts to medical practice is evident and that the knowledge is more sustained.

Dr. Goldberg questions several of our general statements about medical education, including our assertion that it is “not compelling,” especially during the preclinical years. This statement is based upon innumerable conversations with our medical students and education deans from across the country. Dr. Goldberg also questions our belief that “much of what will be taught … will prove to be wrong.” One need only consider the recent changes in long-standing recommendations regarding cholesterol control, prostate-specific antigen monitoring, frequency of mammograms, and the value of hormone replacement therapy to recognize that what we “know” continues to evolve. In 2005, Dr. John Ioannidis published a manuscript describing the reasons why many published research claims turn out to be wrong. Ioannidis cites literature supporting the concern that “in modern research, false findings may be the majority or even the vast majority of published research claims.”

Hurtubise et al present some positive data regarding the use of the flipped-classroom approach at their school and caution that a “change management approach” will be required to implement this model of teaching more broadly in medical education. I could not agree more. Long-standing practices in medicine and education are difficult to change individually, let alone together!

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Charles G. Prober, MD
Senior associate dean for medical education and professor of pediatrics, microbiology and immunology, Stanford School of Medicine, Stanford, California; cprober@stanford.edu.

Cost Must Be a Theme in Our Measurement of Accountability
To the Editor: Baron has presented a fascinating account of the current state of public accountability for graduate medical education (GME) outcomes.1 He is wisely reluctant to recommend too many extra measures and thereby to risk unnecessarily adding to an already heavy measurement burden. Instead he concentrates on themes such as competence, the learning environment, and workforce outcomes. However, there is one theme that I feel he has missed out on—that of cost.

It is difficult to think of a context other than GME where authorities discuss accountability without explicit mention of cost. Shouldn’t we have better public accountability because public money is being spent to fund GME programs? Doesn’t the public have the right to ask whether it gets value for the money spent on these programs? Could institutions run lower-cost programs and achieve the same outcomes? Or could a higher quantity and/or quality of trained specialists be produced with the same expenditure? The short answer to all of these questions is that we don’t know because the research has not yet been done.2

Fortunately, there is a growing interest in cost and value in medical education. Measuring the cost of programs, however, is not completely straightforward, as it is often difficult to delineate and separate out the cost of the provision of medical education and the cost of provision of health care. This is particularly true of GME where authorities discuss accountability without explicit mention of cost. Shouldn’t we have better public accountability because public money is being spent to fund GME programs? Doesn’t the public have the right to ask whether it gets value for the money spent on these programs? Could institutions run lower-cost programs and achieve the same outcomes? Or could a higher quantity and/or quality of trained specialists be produced with the same expenditure? The short answer to all of these questions is that we don’t know because the research has not yet been done.2

When discussing workforce outcomes, we are considering our return on investment.