

medicine

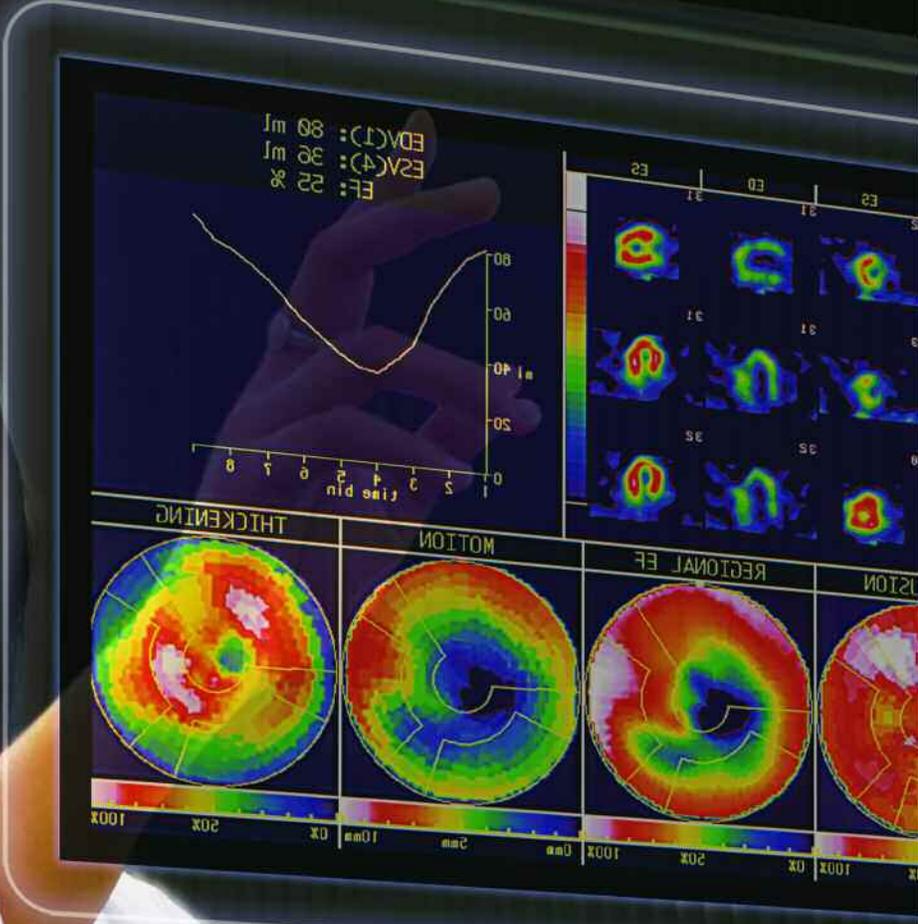
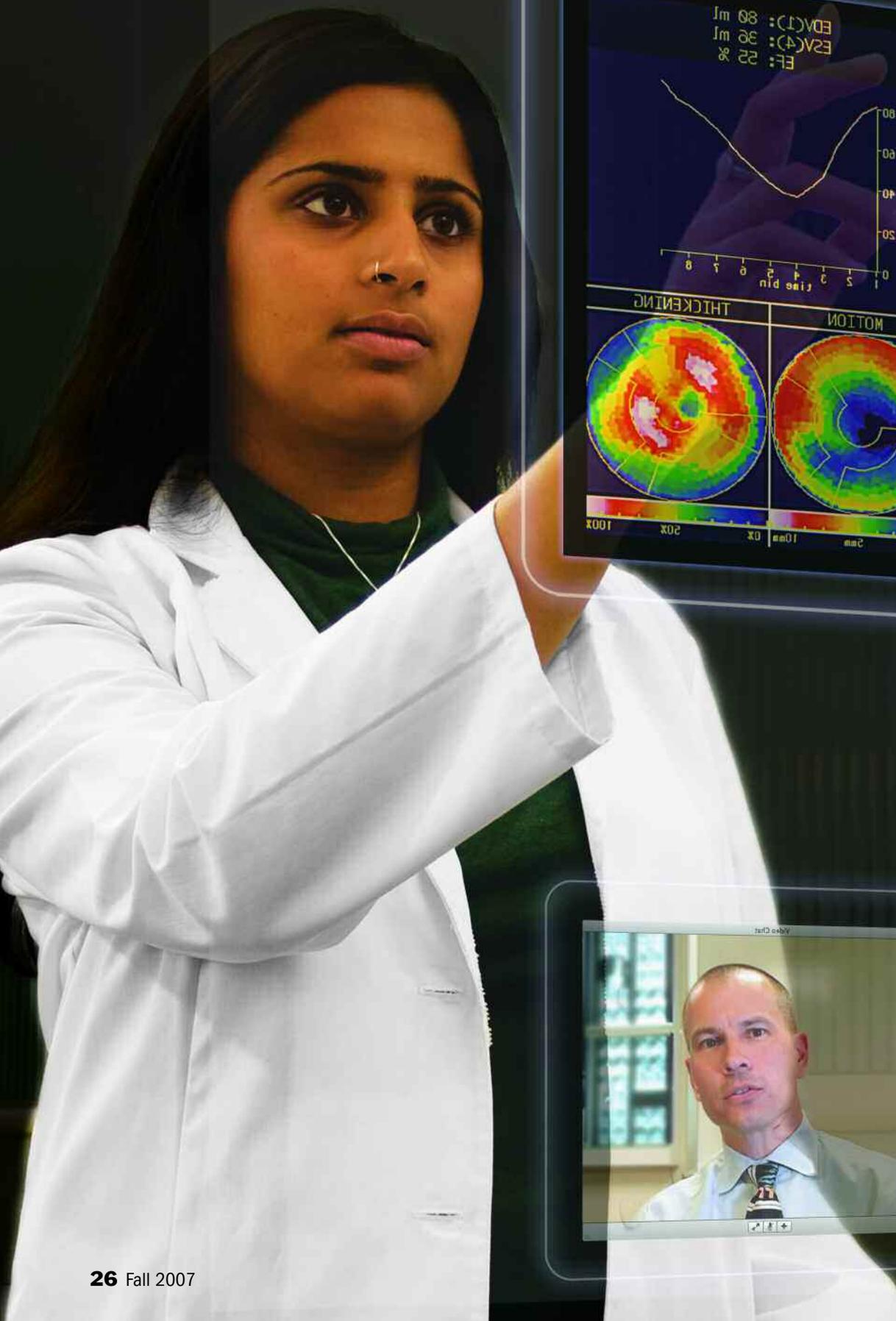
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Body
and Soul







Change Agent

By James Tobin

Virtual anatomy. Simulation. The Web, iPods, blogs, streaming video. Technological innovations are spurring the biggest transformation of medical education in a century, and a groundbreaking online course in clinical therapeutics is already proving the potential.

At the beginning of the Medical School's new advanced course in clinical therapeutics — how to treat patients with drugs — you don't walk into a classroom and sit down next to other students. You don't take out a notebook and a pencil and attend to the professor at the front of the room.

Here's what you do: Sitting in your kitchen at midnight or a coffee shop at lunchtime, you boot up your computer and open your Internet browser. You open CTools, the University's online course management system, then click on the tab labeled "M-4 Therapeutics." Next, you click on "Course Introduction," then hit the play button on a streaming-video portal, whereupon the figure of a man in a red shirt and patterned tie, standing by the statue of Hippocrates in the courtyard behind Taubman Library, says to you:

"Hi, I'm Dr. Cary Engleberg, and this is the senior course on advanced medical therapeutics. So, welcome.

"This course is going to be different from others that you've taken in medical school in that the content ... is almost entirely online. We'll be meeting a few times during the month, but most of the

information you'll get from this course will come across your computer instead of person-to-person.

"The idea of the course is that it attempts to simulate the kind of experiences that you have when you're working on the wards. ... You're presented with cases online and posed with certain questions to deal with. ... And, online, you'll be able to hear some experts say what they think the correct answers to those questions are."

If this is not the future of medical education, it is at least a big arrow pointing in that direction. Certainly, the new "M-4 Therapeutics," launched in January 2007, is the most advanced initiative to-date in the technology-based reformation now underway in the Medical School curriculum.

Of course, nearly every college and graduate school now does a lot of academic business online. Most courses employ at least one electronic tool or another, from online syllabi to discussion blogs to electronic gradebooks. The Medical School has been using such aids for years. Among the most important is the pioneering Professional Skill Builder, a Web-based series of tutorials developed and edited by Richard Judge, M.D. ►

(Residency 1957), adjunct clinical professor of internal medicine, and Rajesh Mangrulkar, M.D. (Residency 1998), associate professor of internal medicine, and managed by Chris Chapman, media services manager at the Medical School's Learning Resource Center (LRC). The tutorials help students develop advanced cognitive skills through highly realistic simulations, peppered with feedback on their performance throughout each module.

But the pressures of the managed-care revolution — limits on doctor-patient interactions, heightened complexity of clinical case loads, the frenetic pace of outpatient care — are spurring deeper thought about how medical schools must adapt. These trends, among others, have led Dean James Woolliscroft, M.D. (Residency 1980), to encourage fundamental innovations in the use of technology in the Medical School. The idea is not simply to help faculty and students perform traditional education tasks more easily or efficiently, but literally to transform the way students become physicians.

The course is designed to help students develop skills in finding information and making decisions that will outlast all the inevitable changes in drugs and therapies they will see during their careers.

“If you look around at our competitors, everyone is looking to change their medical student education program,” says Mangrulkar, who serves as director of ENCORE, a highly innovative pilot program for a cadre of M.D. students entering in 2009. “But most people are playing the game that you work with the tools you have, and you try and fit these new cutting-edge experiences within the framework of what already exists. Very few people are trying to take apart med-



Chris Chapman (center) and Cary Engleberg (right) film Percival Pangjilinan, M.D., clinical instructor in the Department of Physical Medicine and Rehabilitation, for the online course.

ical student education and put it back together in a way that makes sense.

“Dean Woolliscroft’s vision from the beginning has been to say, ‘We need to be out in front of this, just like we were 90 years ago when medical education went through a transformative process as a result of the [Abraham] Flexner report [in 1910]. Now it’s time for us to do it again.’ And I think we can.”

Making the future

If the best way to predict the future is to start making it, then Engleberg may have the clearest vision at the moment. His immersion in the process of creating an online course began in 2006 with a phone call from Joseph Fantone, M.D., associate dean for medical education. Fantone asked Engleberg, who is a professor of internal medicine and chief of the Division of Infectious Diseases, to develop a new fourth-year course that would advance students’ decision-making skills in clinical therapeutics. Fantone felt it should be a course taught principally online. He made a similar call to Chapman, asking him to collaborate with Engleberg.

“I wanted to combine adaptable, cutting-edge technology with learning outcomes focused on advanced cognitive skills,” Fantone says, “and also offer our students a certain level of flexibility. This new online therapeutics course —

required for all our senior medical students — was the perfect place to test an approach that met all of these goals.

“We’re extremely fortunate to have an incredibly high level of educational, medical and technical expertise within our educational program,” says Fantone. “The course has been successful beyond what I imagined.”

Chapman and Engleberg were well-suited to the task. Engleberg was known as an especially creative faculty member and an eager innovator in the use of technology in the classroom. Chapman, trained as a documentary filmmaker, had long experience in developing original educational technology.

The course was well-chosen for an online venture. If taught in the classroom, it would demand a great deal of faculty resources. Also, students in their fourth year are frequently away from Ann Arbor on the hunt for residencies; an online course would allow them to travel without missing course material. And finally, the class was to focus on problem-solving and medical decision-making, not hands-on skills.

“If we’re teaching students how to do an appendectomy, distance learning is not the way to do it,” says Casey White, Ph.D., assistant dean for medical education. “Technology isn’t the answer to everything, but in particular cases, it

provides us with enormous potential for helping students with different learning styles and different learning needs to master the things they need to master.”

Engleberg knew of no course elsewhere that did what he wanted this course to do: help students develop skills in finding information and making decisions that would outlast all the inevitable changes in drugs and therapies they would see during their careers. He wanted them to test their wits against actual cases. He wanted them to see how expert clinicians actually talk about critical decisions in complex cases. And all of this should be enhanced, not hindered, by online delivery.

“For first- and second-year students learning tends to be more passive,” he says. “They all work to master a body of knowledge in lectures and small groups, and everybody learns the same thing. But in the third and fourth years, and for the rest of their lives, learning is different. They’re involved with a case and a patient. There is no curriculum, really. The curriculum is the entire library and the entire Internet. Your education branches in the direction that fits the clinical experiences you have. The evaluations, then, assess judgment and processes of thinking, not how much you can pack into your brain.

“What interests professors teaching on the wards and in the clinics is: How well can students gather information? How well can they synthesize it? Can they come up with a diagnosis? You have to have a certain body of knowledge in order to do that, but here, the skills are different.”

Week after week for months, Engleberg and Chapman met and talked. At first, Engleberg imagined each case study set up in an expanding chain of hyperlinks. Students would be presented with a case and a question; then, depending on their answers, they would link to another question, then another. But this was technically too complicated. Chapman kept emphasizing the need for simplicity. Based on Engleberg’s ideas, he would create a rough form for Engleberg to

experiment with to see how it flowed. Then the two would talk further, and refinements began to emerge.

Meanwhile, Engleberg consulted several colleagues recognized for their excellence as clinical teachers. He asked each to suggest a few actual cases to illustrate particular problems in their specialties. And he asked them to comment on the cases in front of a camera.

That was central to his vision of the course. He wanted students not only to seek out and read the authoritative literature — all available as PDF files or on the Web — but also to simulate the experience of making rounds with an attending physician, hearing him or her talk about a case informally, making decisions amid shades of gray.

He and Chapman made the video shoots easy and quick, usually just in

the faculty member’s office with a hand-held camera. There were no scripts, no special preparation — just Engleberg eliciting frank answers to clinical questions. He told them not to worry about the occasional “um” or “ah.” Then Engleberg himself would edit the video and ship it to Chapman. Chapman and his team at the LRC — Jason Engling, John Westfall and Aki Yao — then processed the video and programmed the cases for the Web.

To craft effective quizzes, Engleberg consulted with White. He told her essays would be impractical, and she said multiple-choice questions could not assess the process by which students were reaching answers — the key criterion of the course. So they worked out ways for students to explain how they reached answers, with partial credit given for evidence of critical thinking skills. ►

A New Kind of Medical School?

The potential of new technology is leading administrators and faculty to ask such path-breaking questions as:

- Does medical school need to be a four-year affair for every student? If the curriculum were unleashed from the constraints of traditional scheduling — could a student then complete the degree in less than four years, or more, based on measurements of his or her competency, rather than the completion of courses?
- Must medical school be confined to the boundaries of the traditional campus? If coursework is presented well enough online, via “distance learning” tools such as streaming video and interactive media, couldn’t many courses be completed anywhere there’s an Internet connection?
- Can medical students take a larger role in their own education, mapping learning plans that diverge from those of their colleagues?
- Is it possible for faculty to spend less time conveying basic information from the front of a lecture hall, and more time in close contact with students, fostering advanced skills in analysis and judgment?

No one knows precisely where such questions may lead, or what shape a new kind of medical school might take. But it’s likely that the U-M will be among the first to find out.

What do you think about increasing technology in medical education at the U-M? Send your opinion to the editor at rkrup@umich.edu.

A gold standard

It took Engleberg and Chapman roughly nine months just to create the first module — on infectious diseases, Engleberg's specialty. Then, as the design gelled, they added more modules until, in January of this year, the course was ready for its first students.



Photo: Martin Vioet

Shelby Stewart, a fourth-year student enrolled in the clinical therapeutics course, accesses the course material from her off-campus apartment.

Cases, readings, quizzes — all appeared in an elegantly simple online smorgasboard. Learning objectives, and how to reach them, were laid out with far greater clarity than in many conventional courses. Beyond attending a few in-the-flesh seminars, students could do the work anywhere from the Taubman Library to Tanzania, at any time of day, with astonishing freedom to tailor the course to their own needs — especially to go fast or slow, to choose or ignore specific resources, and to fill the gaps in their own stores of knowledge.

Take one case study as an example. It's one of three cases in respiratory therapy during the first week. You find six

learning objectives listed, including: "Know how acute exacerbations (status asthmaticus) are treated."

That objective leads to Case #2: A male college student, after his usual three-mile daily run, has difficulty breathing and is hospitalized and intubated. His condition is scary-critical. His history, treatment by EMS techs, and physical and lab tests are reported to the student.

Then comes the first question — "Which of the following will be useful elements in the care of this patient?" — followed by six choices. If you click on

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—Cary Engleberg

"B. Parenteral beta2-agonists," you're told that's "not recommended" and why, then directed to the PDF file of a seven-page article, "The Crashing Asthmatic," in *American Family Physician*, plus other references.

Each of the six answers leads the student to helpful information. And at any point, the student can click on perhaps the most rewarding part of the presentation — a two-minute video of Cyril Grum, M.D. (Residency 1983), professor of internal medicine and associate chair for undergraduate medical education, an expert on exercise-induced asthma, among other topics.

What's striking about Grum's talk is not just its casual thoroughness, but its pithiness and candor. He begins by saying: "This person meets the definition of status asthmaticus, which is, you know, essentially asthma out of control. ... These are moments when even the most experienced clinicians can feel a tinge of panic and you probably should too, at

this point. The most important thing is that the patient is oxygenated well."

It's hard to imagine a student who fails to appreciate the admission that even the best doctors get scared — and, therefore, who fails to remember the remedy.

The course has now been taught three times, with data showing impressive learning results. The response from students themselves has been highly positive.

Former student Caesar Gonzales (M.D. 2007) found the faculty videos especially helpful. "Research articles are

hard and dense," he says. "But in the videos, faculty members were able to break things down in a way that was easy to absorb."

As Engleberg and Chapman refine the course further, White is urging them to publish an account of how it works — and how well.

"When faculty say to me, 'What can I do that's better than lecture, or that's more interactive?' I can show them Cary's program," White says. "I say, 'Here's what we're capable of doing, and here's the kind of information we can get back for you.' So I do think we're going to march that way, and Cary's course has allowed me to have this gold standard, to say, 'Here's what we've done; how can we make it work in your course with your material?' It's exciting, and it works!" [m](#)

Web exclusive! Experience firsthand a sample of the online "M4 Therapeutics" course! www.medicineatmichigan.org/magazine