



# How ‘collaborative learning’ is transforming higher education

*Technology is enabling more dynamic teaching and learning—both inside and outside of class*

At Duke University, business school students use a state-of-the-art “virtual lecture hall” to have conversations with CEOs and fellow students from around the world.

At Harvard, physics students learn from each other—as well as their professor—by discussing key “concept questions” in small groups periodically during class.

And at dozens of institutions nationwide, students continue their discussion of lessons long after the class period is over, through “social collaboration” platforms that move the conversation online.

Welcome to higher education circa 2012, where on many campuses, the stale, passive lecture model is being

replaced by a more dynamic way of teaching and learning—one in which students and instructors collaborate in a give-and-take fashion to “make meaning together,” says Tony O’Driscoll, a professor of business administration at Duke.

Today’s students have come of age in a world where they are constantly connected with friends on Facebook, and they use this and other social media tools to make sense of their shared experience together. Now, colleges are using similar technologies to engage students in course content in ways that resonate with a generation accustomed to a new way of learning.

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All this comes at a time when employers have higher expectations for recent college graduates, and colleges must make sure they're giving their students the right skills to excel in a faster-paced world.

"Technology is enabling and also forcing students, in some ways, to become self-learners," says Catheryn Cheal, vice president and senior officer of academic technology at San Jose State University. "They're going to be expected to have a certain amount of learning initiative throughout their career, and that's different than how it used to be."

Students might enter college knowing how to seek out information, Cheal notes—"but we need to teach them to take it deeper ... than just Googling."

She adds: "Our job is to keep up with that, and to help

nect with today's students. Using a laptop to present a PowerPoint slideshow, for instance, doesn't engage students as they're used to engaging with technology.

"In 2007, students who felt positive about the campus learning management system [LMS] was about 77 percent; in 2010, it was only about 51 percent," says James Webb, chief information officer at West Texas A&M University, citing EDUCAUSE data. "Why is that? Because what faculty typically have done is just put their PowerPoint or data inside the LMS. There's not really any point to that. These are the students [who] are watching video and ingesting video as part of their daily lives. More than 80 percent of student respondents say they prefer to learn through listening to audio or watching video content."

Today's students browse freely on YouTube, seek information on their iPhones, and engage in the content through online comments and discussions. "Then they come to class, listen to a lecture, see the PowerPoint. They

streaming music through a tablet, and texting on his smart phone. In the past, when thinking about designing your network, you thought about one device per student and designed the network based on that load," Tuohy says. "Now, students have three or more devices, and they're downloading things that suck a lot of bandwidth—so an institution needs a robust and scalable network to deal with [this increased] traffic."

### 'Flipping' expectations

To support more collaborative learning experiences, many schools have begun embracing the concept of "flipped learning," a trend that has spiked in popularity.

In flipped learning, the transfer of information takes place outside of class, and class time is used for assimilating this information and applying it in new contexts. That's a reversal of the traditional instructional model, when professors would impart knowledge through lectures and students would apply what they'd learned as homework.

Now, many instructors instead are recording lectures and other course content and posting these online, for students to watch and/or read before class. During the class period, students discuss the material or work on projects and in groups.

As far back as 10 years ago, Case Western Reserve University was exploring the notion of flipped learning.

"We began to start doing lecture capture, where you ... record the class as the lecture is going on and put [it] online for students to be able to see after the class ran," says Wendy Shapiro, senior academic technology officer for Case Western.

But as time went on, she says, faculty realized that if they already had a recording of a lecture, they could make it available to students online and use class time for a more meaningful activity. "So the flip is, you get the lecture online and do the homework in the class, because as [students are] working on problems and running into difficulties, this is where they need the guidance and the help and the redirection," explains Shapiro.

Flipped learning, she adds, "opens the opportunity for more collaboration in the classroom."

Harvard University physics professor Eric Mazur has been using a variation of flipped learning, which he calls "peer instruction," in his classes for several years.

First, Mazur summarizes the key concepts that students were to learn by watching a lesson outside of class. Then, he poses a question that forces students to think about the information and apply it in a whole new way. Students consider their answer, then respond using personal response system technology.

Next, Mazur has students discuss their answers with their peers who are sitting nearby, with students taking turns defending their choices and the reasoning behind them. Then, he poses the question again and has students re-answer—and he finds the percentage of correct answers nearly always increases the second time around, once students have had a chance to discuss the problem with their peers. Finally, he shares the correct answer and the explanation.

The discussion part is key to the success of Mazur's strategy. It allows the better students in the class to help teach the others—and everyone benefits in the process, he says, citing research that suggests peer instruction can lead to better retention.

There are several challenges to implementing this strategy effectively—including how to design good questions, optimize the discussion, and manage class time. To address these challenges, Mazur and two Harvard colleagues have developed a unique software-based system called Learning Catalytics.

The software uses intelligent algorithms and data analytics to improve the quality of questions that in-



West Texas A&M students engage in collaborative learning with the help of technology.

students with that change. It used to be that you'd go to school, and all the information would be poured into you. Now, you get a job, but the software is changing every few years—and you better know how to keep up to date."

As students come to expect more interactive forms of instruction, colleges are stepping up to meet this need.

In a 2012 survey, the Center for Applied Research at EDUCAUSE, a higher-education technology group, found that 64 percent of students think technology can elevate the level of teaching—and more students said their instructors have used technology in their teaching this year than two years ago (70 percent compared to 49 percent, respectively).

Additionally, instructors are using technology more effectively than before, the study suggests: In 2010, just 47 percent of students said most of their instructors were using technology effectively to advance their academic success, compared to 68 percent who said that was the case this year.

Higher-education institutions have found that simply using technology in the classroom isn't enough to con-

go to the LMS later, and there's the PowerPoint again. What they're used to seeing is not there," Webb says.

A key challenge for colleges and universities as they move to a more dynamic, collaborative model of instruction is providing enough wireless bandwidth for students to continue their learning anywhere on campus.

"In the past, you might go to ... a roomful of computers connected to the network," says John Tuohy, education industry marketing manager for Cisco Systems. "Now, you have students bringing their own laptops, tablets, smart phones, and the network connection is ubiquitous." He adds: "The network is now a utility like the lights or the water; people take it for granted. You flick a switch and expect the lights to go on. It's the same with wireless networks. You expect to be able to get on wherever you go."

The use of video on campus has exploded along with the growth of wireless networks, which has interesting repercussions because video traffic uses a lot of bandwidth, says Tuohy.

"A student might be in a dorm working on a laptop,





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structors can pose. It also helps instructors pair students who gave right and wrong answers during the discussion phase, and it helps instructors know when it's time to wrap up each phase of the process and move on.

The software platform is device-agnostic, meaning students can log in with whatever mobile device they already own. And it supports many types of questions, so instructors aren't limited to multiple-choice queries. For instance, responses to open-ended questions can be analyzed by creating a word cloud, and the system also supports numerical or ranking questions, as well as those involving diagrams.

In addition, the software shows the relative location of everyone in the room, so the instructor can see who gave a right or wrong response, as displayed by red or green icons on the instructor's computer screen. This allows the instructor to pair students who gave right and wrong answers more easily, which facilitates the peer instruction process, Mazur says.

## Video conferencing creates 'interactive lecture halls'

Interactive lecture halls also are turning the traditional teaching model on its head.

Two years ago, Duke University built a virtual lecture hall—a high-definition media collaboration room—to provide students at its Fuqua School of Business with access to professors, business leaders, and guest lecturers from around the world. The facility, custom-built using Cisco's TelePresence technology, includes three 103-inch plasma displays, six 1080p cameras for both panoramic and life-size immersive video experiences, an instructor's podium with two document cameras for sharing class materials, three remote student displays for the instructor to view remote classrooms from the podium, and 66 custom push-to-talk microphones for interactive discussion, according to a press release.

The lecture hall, which accommodates 200 to 300 people, was inaugurated with a CEO master class. A select number of Fuqua Business School students were invited to participate in an interactive conversation with Cisco Chairman and CEO John Chambers, along with Kleiner Perkins Caufield and Byers partner John Doerr, who

joined the students from Cisco's headquarters in San Jose, Calif. Several students also joined the class from New Delhi, India.

"The lecturer can stroll around, and there are pressure-sensitive pads on the floor, so as the presenter walks and moves, the camera pans to follow him. When students want to talk, they press a button to turn on the microphone," Tuohy says.

Webb says West Texas A&M has constructed several similar types of classroom environments. For a financial planning class, West Texas A&M used one of these interactive spaces to bring a trader from Hong Kong into the classroom via video conferencing. On one screen in the classroom, students could see the trader and pose questions. On another, the instructor brought in live, real-time market information as the discussion unfolded.

"Students were getting to hear [about] a day in the life of a financial trader from Hong Kong," Webb says.

Case Western recently installed an "active collaboration room." The room has a large TelePresence screen at the front of the room, but also an interactive whiteboard (IWB) on the wall, other projection screens, and collaborative tables that seat from three to six students. There

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## Tech helps faculty, students interact 'in much richer ways'

Collaborative learning isn't new, but technology is giving it a new spin and is making it easier to exchange ideas and complete group projects—regardless of where students or instructors happen to be.

Duke University is working with Cisco Systems to pilot a cloud-based social collaboration tool, called WebEx Social, that is geared toward the needs of higher education in particular. Students in an MBA program at Duke's Fuqua School of Business, along with business school students in other countries around the world, have used the tool to work online asynchronously while being able to track and participate in what other students are working on.

The students worked together to create and edit videos that shared their experience in other countries and other cultures. They could comment on the videos and other course materials, share their expertise on different topics, and engage in other "standard social networking" activities, says Tracy Futhey, vice president for information technology and chief information officer at Duke.

The tool is particularly useful, Futhey says, because it solves the challenge of dealing with several different student identities and sign-ons for various social networks.

"With other systems, you need a different log-in, you have a different account, [and] people have to know how to contact you on each one," Futhey says. "You end up with 30 different accounts for 30 different entities—Facebook, Skype, eMail, you name it. This gives us the ability to integrate [and collaborate online] with one identity."

Mark McCahill, an information systems architect at Duke, describes WebEx Social as a tool that is like Facebook, but resides "behind the firewall" of a college or university—meaning campus leaders have more control over security. Its "combination of asynchronous collaboration and an activity feed of who's doing what—plus real-time interaction—has been a win," he says.

The system's home page is like a personalized dashboard that displays a calendar, activity stream, and a "Watch List" to help users keep track of posts and ac-



A 'virtual lecture hall' connects Duke business students to experts from around the world.

tivities that are most relevant to them.

Creating a post to share content with others is as easy to creating an eMail message. Users can attach a variety of media types (regardless of file size), share posts with members of specific teams or groups, and control who has permission to comment on, edit, and share posts.

WebEx Social integrates with leading eMail programs, so users can read posts or participate in discussions without leaving their eMail. It also integrates with Microsoft Office applications, so users can edit shared documents or view comments without leaving Word, Excel, and so on. The software tracks changes to common documents and merges edits, and a mobile app allows participants to use the software from an iOS or Android device.

A social search function helps users quickly locate experts on a particular topic and ask them questions. Students and instructors also can connect with other users seamlessly by launching video calls, instant messaging, or a WebEx conferencing session from within the platform itself.

"We're excited about the ability to take existing applications we're working on, on campus, and have them able to be linked to, updated, and shared through WebEx Social," Futhey says.

Technology such as WebEx Social "enables faculty and students to interact in much richer ways, with much better learning outcomes," says L. Gregory Jones, vice provost for global strategy and programs at Duke.

—J.N.

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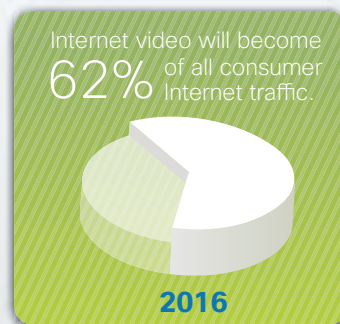
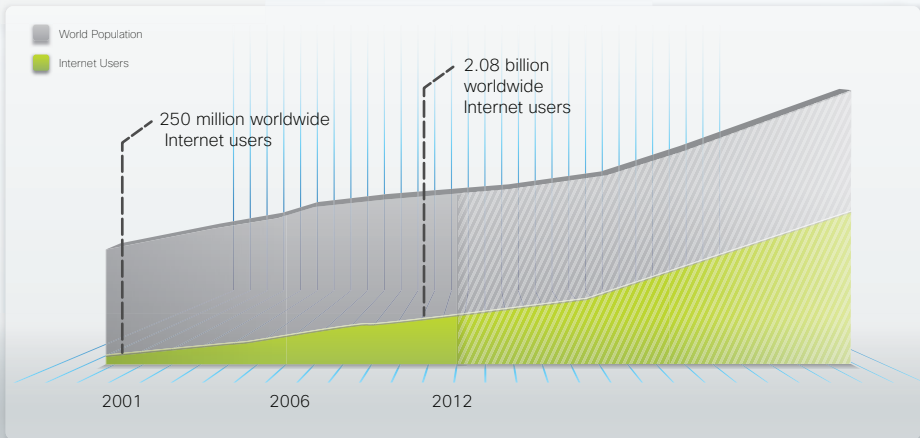
# Preparing Today's Students for Tomorrow's Challenges



## The Impact of Video in Education

The way we work, play, teach and learn has been transformed by a variety of global shifts.

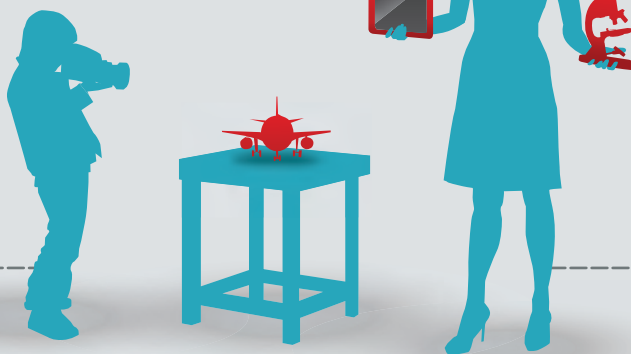
People are becoming more connected...



...and video is becoming the preferred channel of communication...

...fundamentally changing the way we learn...

Students are no longer passive receivers of content, but **active designers** of their learning experience.



...and the way we teach.

Educators have a greater insight into how people learn and have realized when it comes to education, **one size does not fit all.**

Video is essential in the process of advancing education.

### Video helps:



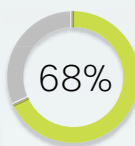
## Video in the Learning Process

Today, employers and education leaders consider critical problem solving, communication, and collaboration skills to be just as important as the ability to score well in standardized tests.

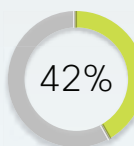
Video helps develop these critical skills through:

### Enriching the Classroom Experience

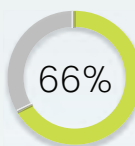
Video ignites students' creativity and collaboration. Studies polling teachers found that:



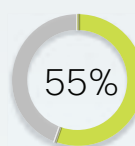
believe video content stimulates discussions



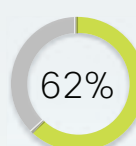
believe video directly increases student achievement



believe video increases student motivation



believe it helps teachers be more creative



believe video helps teachers be more effective

### Better Utilization of School Resources

Experts and educators can reach larger numbers of people, both in the classroom and in remote areas:

Because video combines a variety of media, instruction can be adjusted to diverse learning styles.

- Text
- Sound
- Motion
- Images





## Improving grades and outcomes

On-demand video has been shown to impact grades and test performance through a large number of studies conducted by colleges and universities.

44%



When students in the Charlotte-Mecklenburg school district grades 5-8 used streaming video, 44 percent scored higher on their end-of-year science exam.

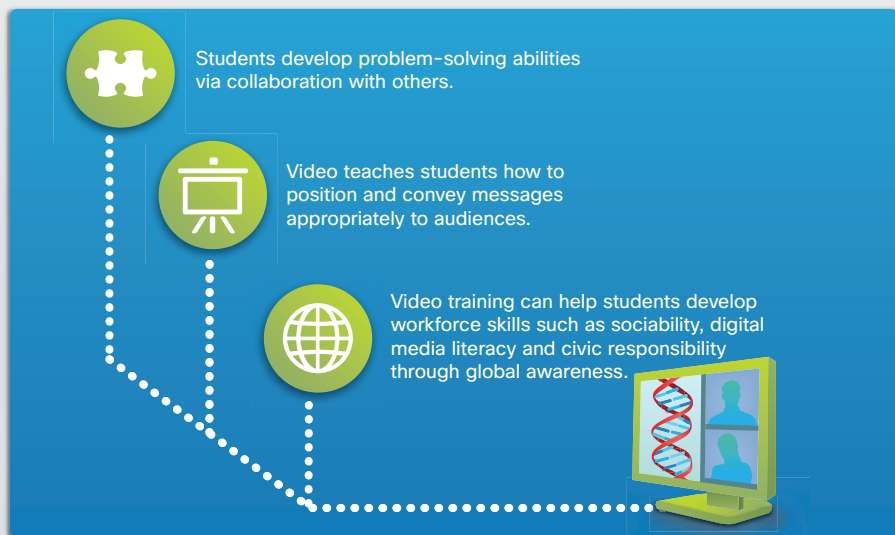
91%



When University of Massachusetts students used lecture capture, 91 percent felt it helped them learn course material.

## Better preparing students for the workforce

Video helps bridge the gap between a school's insulated environment and the outside world, bringing reality into the classroom.



## Implementing Video in the Classroom

In order for video to be successful, it has to be embraced by the educator, integrated within the curriculum, and implemented strategically into the overall learning experience.

Video should be seen as a complementary tool for learning rather than a substitute.

## Incorporate Video Into the Teaching Process

1

Frame

**Frame** the learning: Preview the discussion, provide context, and elaborate on difficult content.

2

Adapt

**Adapt** the viewing experience to each student's individual needs.

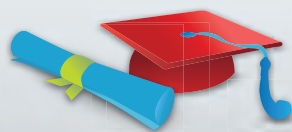
3

Extend

**Extend** the learning using post-viewing discussion.

## Teach Teachers First

Educators themselves must first acquire the digital media skills necessary to incorporate video, then sustain them through ongoing professional development.



## Gain Top-Down Support

Educators feel more empowered when they have the support of their administrators, better overcoming obstacles for successful integration.

It is now up to us to strategically adopt video technologies into the classroom, and guide our students in developing the skill sets necessary to fulfill their role as global citizens of the 21st century.



Cisco: Transforming Education Together

Download the full whitepaper:  
[http://www.cisco.com/web/strategy/docs/education/cis\\_covideowp.pdf](http://www.cisco.com/web/strategy/docs/education/cis_covideowp.pdf)



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are three cameras, and when a student or instructor is speaking, or if the instructor is writing on the board, one of the cameras pans to this person automatically.

By taking part in collaborative learning, Shapiro says, students can learn from each other.

For instance, social work professor Terry Hokenstad worked with Shapiro to plan an international collaborative learning community. Hokenstad and a colleague teaching in Hong Kong decided to co-host a class on disasters in social work. The class started at 8:00 p.m. in Cleveland, which was the next morning in Hong Kong.

“It was incredible, because here you had two sets of very professional students,” says Shapiro. “It was truly like having the two classes together.”

The collaboration began with the students introducing themselves and the social work projects they had been involved in. Then, they discussed their own experiences with disaster management—what worked and what didn’t.

“When the students on both sides started talking to each other, it was magic,” Shapiro says.

Colleges and universities don’t need a new lecture hall to implement telepresence technology. All you really need, Tuohy says, is a telepresence endpoint—which can be as simple as a desktop computer—and an internet connection. A new Cisco product called TelePresence Synch turns an IWB into a telepresence endpoint; using the IWB software, instructors can record lessons and then send them to students for watching or reviewing outside of class.

Arizona State University is using “personal telepresence” software from a company called Vidyo in its School of Life Sciences to connect students with important advancements in biotechnical and biomedical research. The school launched a virtual classroom program that connects students with experts, scientists, and researchers in locations around the world.

ASU students frequently connect with experts at the Smithsonian Institution in Washington, D.C., as well as the Smithsonian’s Institute for Tropical Research in the jungles of Panama. Users can join these conferences from a PC, Mac, or an Android or iOS device running VidyoMobile software.

A program called VidyoReplay lets instructors record these sessions and archive them for later use, and students and researchers are able to share their desktops during a meeting as well.

“We needed to link ... to scientists in remote areas—environments that required something very flexible, very portable,” said Charles Kazilek, director of technology integration and outreach for ASU’s School of Life Sciences. “We wanted to see how far we could penetrate literally into the jungle and bring back that experience to our students. Could we run it on 3G? Can we get it in the jungle? ... What we found is, yes—we can.”

### Social collaboration platforms

Discussions aren’t just happening live during class time; thanks to new social collaboration platforms, they’re also happening 24-7 online.

“The classroom is a very different kind of thing than it was 10 years ago,” said Cathy Davidson, Ruth F. DeVarney Professor of English at Duke. “It doesn’t just exist for an hour and a half each week. ... The classroom exists constantly, day and night, online.”

LMS providers are integrating social media tools into their software to allow for both synchronous and asynchronous discussions of course content long after the class period ends. Duke is piloting a social collaboration platform, called WebEx Social, geared specifically toward higher education (see side story). And some of the same online services that enable professors to capture and share lectures and other video content—driving the flipped

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*“The classroom is a very different kind of thing than it was 10 years ago. It doesn’t just exist for an hour and a half each week. ...*

*The classroom exists constantly, day and night, online.”*

*—Cathy Davidson, Ruth F. DeVarney Professor of English,*

*Duke University*





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learning concept—also include social media features that can take learning to another level.

San Jose State has integrated Canvas, an open-source LMS from the Utah-based company Instructure, with its PeopleSoft student information system. Besides getting their grades, seeing course assignments, and taking online quizzes, students also can engage with other students via the software.

“With Canvas, there are online discussion boards, they can read their colleagues’ views, there’s a chat system, there are wiki capabilities where they edit others’ assignments and papers,” says Cheal. “It makes [collaboration] very easy.”

This past summer, Microsoft announced that its web-based Office 365 for education now is available free of charge to college faculty and students. The cloud-based software suite includes Office applications such as Word, Excel, PowerPoint, and OneNote, as well as Exchange Online for eMail, SharePoint Online for collaborating, and Lync Online for audio, video, and web conferencing.

Office 365 for education is Microsoft’s answer to Google Apps for Education, another suite of free and low-cost online eMail and collaboration tools. The Center for Cartoon Studies, based in Vermont, relies on Google Apps to facilitate collaborative learning among its students and instructors.

“Our school is built around collaboration, and Google Apps for Education makes it easy for our artists and students to work together,” says Michele Ollie, co-founder and president of this premiere cartooning school. For example, she says, Google’s Smartsheet app “lets us share key documents with many collaborators, track progress, facilitate online discussions, [and] send automatic eMail updates and reminders.”

She adds: “Schools can spend a fortune on IT, but these free and low-cost cloud applications help our school thrive

on a very modest budget.”

Some of the same tools that instructors are using for recording and disseminating their lectures include features to help make learning a more collaborative process.

For instance, Cisco’s LectureVision is a software program for capturing and sharing lectures with little effort. All a teacher has to do is record a lecture, and the software automatically encodes this recording so it can play on any device.

The sharing feature, called Show and Share, is like a “private YouTube” for schools, Tuohy says, helping colleges create secure video communities in which members can share ideas and expertise. Instructors can publish lectures and tutorials to their school’s Show and Share page. Viewers can comment on the videos, and their comments can be time-coded to a particular point in the lesson—making it easy for instructors to see exactly where students had a question.

“It’s interactive,” explains Tuohy. “I’m watching this lecture, and five minutes in there’s a concept I don’t understand. I can time-stamp that spot, and the teacher might see that a lot of questions were coming in around that concept, [which the teacher] might need to clarify.”

What’s more, Cisco’s video analytics software, called Pulse, automatically tags video content by speaker and by keyword using speech recognition technology, the company says. This helps users find relevant content faster: They can jump to specific parts of a video by choosing a speaker, a keyword, or even a keyword mentioned by a particular speaker.

Here’s how it works: The software uses speech recognition technology to create a list of relevant keywords, then identifies every place in each video where these keywords are spoken and where each speaker speaks. A list of speakers and keywords appears beside each video, so viewers can go directly to relevant segments by selecting a speaker or keyword.

“So if you have a panel discussion and you just want to jump to sections where John Smith is talking, you can jump to him and only see him,” Tuohy explains. “Or to get more

granular, if you want only sections where John Smith is talking about Iwo Jima, it will show you just those.”

Recording lessons and posting them online is extremely useful for distance learning, according to Webb.

“We did a research project and found that, with classes that are taught face-to-face versus those taught online, students are showing less satisfaction with the instructor online,” says Webb. “They’re not as impressed with the online faculty member, because they’re missing the interaction; they don’t get to come to a classroom and see [the instructor]. It’s a distanced experience.”

West Texas A&M has used lecture capture to bridge that gap. Allowing students to see the instructor teaching has garnered positive results.

As one student wrote in an eMail: “With the most heart-felt emphasis possible, I want to thank you for taking the time to create a video instruction for this assignment. This video tutorial has eased some of my negative feelings about this assignment.”

Lecture capture is improving student evaluations in those online classes, making them more consistent with those from face-to-face experiences, Webb says. And, because faculty are measured in part based on student evaluations, if they can improve their evaluations by using video, “that will entice them to jump into this full force,” he says.

Webb calls Show and Share a combination of Facebook and YouTube. “It’s a social collaboration system. We can put information on there, students can rate the video, share it, comment on it, tag it,” he says. The university has linked the Show and Share system to its identity management system, so students have a single sign-on.

“One in three students is using social networking to collaborate with students [who] are taking the same course,” Webb says. “This is another way we can enrich the online experience for our students. We’re trying to move that needle.”

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*Jennifer Nastu is a freelance writer from Colorado who writes frequently about education and technology.*

## A snapshot of student-owned devices on campus

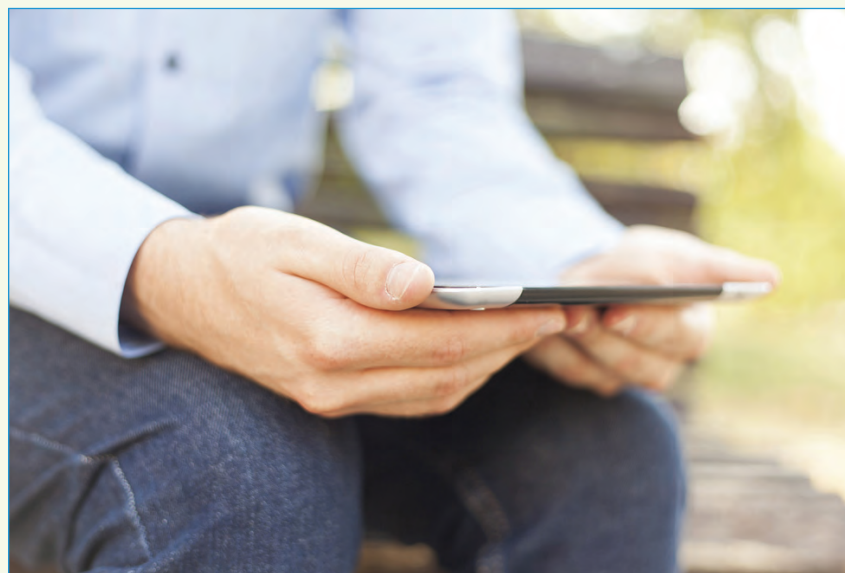
As campus leaders wrestle with how best to use technology to develop and deliver new instructional models for their students, they also must take into account the number of various devices students own, as well as the variety of brands and operating systems among those devices, according to the EDUCAUSE Center for Applied Research’s 2012 Study of Undergraduate Students and Information Technology.

The study found that:

- Laptops are still the top device of choice, with 86 percent of college students owning one. Among students who use laptops for academics, 76 percent use Windows-based laptops and 21 percent use OS X/Mac laptops.
- Fifteen percent of students own a tablet, and of those, two-thirds use the device for academic purposes. More students use iPads than Android tablets (57 percent versus 25 percent, respectively).
- Twelve percent of students own an eReader device, and 47 percent of those use it for academic purposes. Of those who own eReaders, 59 percent use a Kindle and 24 percent use a Nook.
- Smart phone usage is on the rise: 62 percent of students said they own a smart phone today, compared with 55 percent in 2011. Of those who own smart phones, 67 percent say they use them for academic purposes, compared to 37 percent in 2011; 44 percent use an iPhone, while 46 percent use an Android device.

Students want to be able to access both academic progress information and course material via these various mobile devices, and nearly all students say that basic services and resources at their institutions are available online or via mobile applications. The majority of students who own a mobile device have used it to access educational services or resources, including grade checking (accessed by 85 percent of students), course websites/online syllabi (85 percent), and course/learning management systems (82 percent).

“Striking a balance between device-neutral apps and apps that are optimized for specific mobile platforms is tricky but critical in the bring-your-own device era,” the report states.



15 percent of college students own a tablet; 12 percent own an eReader.

Despite the balancing act schools must negotiate in order to provide the right tools in the right ways, students now expect it.

“It’s what the campus experience needs to be,” says Kenneth C. Green, founding director of the Campus Computing Project, a continuing study of the role of computing, eLearning, and information technology in American higher education. Schools that don’t have the right technology are at risk of falling behind, he adds. —J.N.

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# INSPIRE BRILLIANCE

it's where learning doesn't always take place in a classroom and where discovery can happen anywhere, at any time. it's where video has opened the door to learning and collaborating in a whole new way, and where class is always in session. it's where every single person can connect with teachers of all kinds wherever they may be. it's where great minds can easily come together, so it's also where the sky is the limit.

Learn more at [cisco.com/go/education](http://cisco.com/go/education).

