

LEARN NOW, LECTURE LATER

CDW·G report reveals schools are shifting away from lecture-only classes as use of classroom technology increases.

Executive Summary

Traditional lectures have long been a standard and acceptable way to educate students. But an increasing number of educators are exploring alternative ways to better connect with students and create a more effective learning environment – and they are using technology to support this change.

According to CDW·G's 2012 *Learn Now, Lecture Later* report, which surveyed 1,015 students, faculty and IT staff in high schools and colleges, nearly half of all faculty have moved away from the lecture-only model of teaching and are now using different instructional methods, such as having students collaborate on projects together.

To support the move, some innovative teachers are experimenting with the *learn now, lecture later* approach – also called the “flipped classroom” – where students watch recordings of lectures online as homework. They learn the material on their own time, freeing up class time for more interactive and collaborative activities.

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Learn Now, Lecture Later

You can download and view the entire report here: CDWG.com/LNLLreport

Technology enhances student learning and helps facilitate the shift in teaching methods. Today's youth, who are fully immersed in technology when they are outside of school, are embracing the infusion of technology and changes in instruction. In fact, the CDW-G report shows that while school districts and colleges have increased their investments in classroom technology over the past two years, both students and faculty want even more technology in their classes.

This white paper, through survey results and interviews with IT leaders, faculty and students, will explain how the different learning models are affecting high school and college classrooms. It highlights the types of technology that campuses are using to support the move to new learning models and identifies the technology that faculty and students want in their classrooms moving forward.

The white paper also explores the challenges that schools and colleges must overcome to move beyond traditional lectures and provides recommendations on how to make a successful transition.

The State of Classroom Technology and Emerging Learning Models

This section first explains the classroom technologies in use today and then describes how faculty are deploying new learning models through the use of technology. It will

also share survey results on how students want to learn and the types of educational technologies that faculty and students want their schools to invest in.

Classroom Technology Use on the Rise

Today, more than 70 percent of students and faculty say they are using more classroom technology than they were two years ago – proof that educators are recognizing the importance of engaging students with interactive, multimedia-rich lessons and activities.

Students and faculty say the three most widely used technologies in classrooms today (after notebook and netbook computers) are digital content, learning management systems and smartphones. The popularity of these technologies in classrooms reflects the ubiquity of mobile devices, the emergence of online learning and the growing demand for anytime, anywhere access to educational resources.

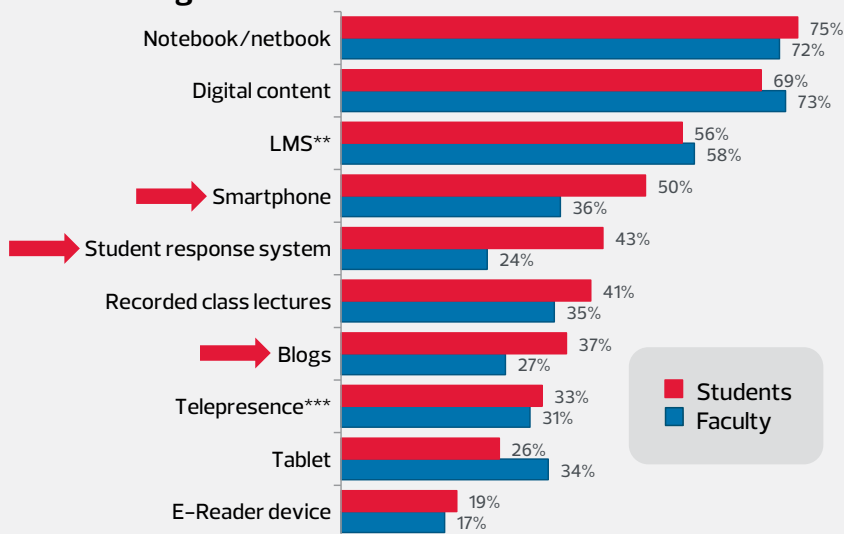
About 70 percent of students and faculty use digital content, which includes electronic textbooks, multimedia-rich applications, online videos and other online learning tools. In addition, a majority of students and faculty are using learning management systems, which not only deliver online courses, but also serve as a repository where students can upload their homework and instructors can post educational content, such as course syllabi and videos of their lectures.

Some learning management systems also allow faculty and students to communicate and collaborate through instant

messaging, discussion forums and web and video conferences. "Students can work in teams and collaborate on a project when they are not physically in the same spot," says Billie McConnell, director of K-12 professional development at Connected Consulting, an educational consulting firm owned by Abilene Christian University in Texas.

Students are more likely than faculty to use three technologies in the classroom: smartphones (50 percent of students to 36 percent of faculty), student response systems (43 percent to 24 percent) and blogs (37 percent to 27 percent). Meanwhile, faculty members are more likely to use tablets than students (34 percent to 26 percent).

What technologies do you personally use in the classroom as a learning tool?*



Arrows denote statistical significance *Respondents asked to select all that apply **Learning Management System ***Includes telepresence, video conferencing and/or web conferencing Source: CDW-G, *Learn Now, Lecture Later* report, June 2012

The fact that half of all students are using their smartphones in class shows that bring-your-own-device (BYOD) initiatives are gaining traction. Instead of outright banning smartphones as they might have done in the past, many teachers and professors now recognize that mobile devices are good learning tools. Students can use them to take notes, conduct research online and learn from mobile educational applications, says Paul Resta, director of the Learning Technology Center at the University of Texas at Austin.

The survey also found that some technologies are used more often in higher education than in high schools. College students are more likely than high school students to use digital content (74 percent to 64 percent), learning management systems (72 percent to 40 percent), smartphones (55 percent to 45 percent) and recorded class lectures (53 percent to 30 percent).

College professors are also more likely than high school teachers to use digital content (80 percent to 66 percent) and learning management systems (67 percent to 49 percent).

Faculty Seeking a Fresh Approach

Instead of standing in front of a class dispensing knowledge, many teachers seeking a fresh take on instruction are now reapproaching their position, serving more as learning guides in the classroom, which empowers students to drive their own learning.

According to the survey, 47 percent of teachers say they have shifted away from straight lectures over the past two years. Another 20 percent of them are considering using different instructional delivery methods.

Adoption of new learning models, such as project-based learning, flipped classrooms and game-based learning, is increasing, says McConnell, the educational consultant.

"We are seeing real movement toward student-centered, inquiry-based learning. Schools are realizing that it is no longer only about knowledge and comprehension. They realize they need to produce students who are critical thinkers and can collaborate and do research," he says. "It's the vision of teaching 21st century skills, getting students engaged and making learning relevant. That requires a different instructional model, and technology is the tool they use to get there."

When high school and college faculty were asked which alternative teaching method they've deployed most frequently over the past two years, project-based learning and hands-on learning activities are the two most frequently cited.

In high schools, 64 percent of teachers used group projects and 60 percent deployed hands-on learning activities. Independent, self-paced study ranked third at 41 percent, followed by one-on-one tutoring (35 percent) and distance/virtual learning (15 percent).

At college and university campuses, 59 percent of faculty preferred hands-on learning activities, 51 percent used group projects and 37 percent taught via distance/virtual learning. Another 31 percent taught using independent, self-paced study and 13 percent provided one-to-one tutoring.

By moving away from traditional lectures, Dr. Leonard White, associate professor at Duke University, says he is more satisfied with teaching.

"I'm not just preparing a speech. I'm entering an environment where I don't know what will happen. I create the process, but students drive how I interact with them. Quite frankly, that is a fun way to operate," he says. "The classroom now becomes an exciting place where learners are ready to apply their knowledge instead of passively consuming information. Technology is key to making that happen."

Students who were surveyed say they often get bored during traditional lectures that last the full class period. When they watch videos online, do hands-on activities or tackle projects with their classmates, they are better able to learn the material and retain the information, they say.

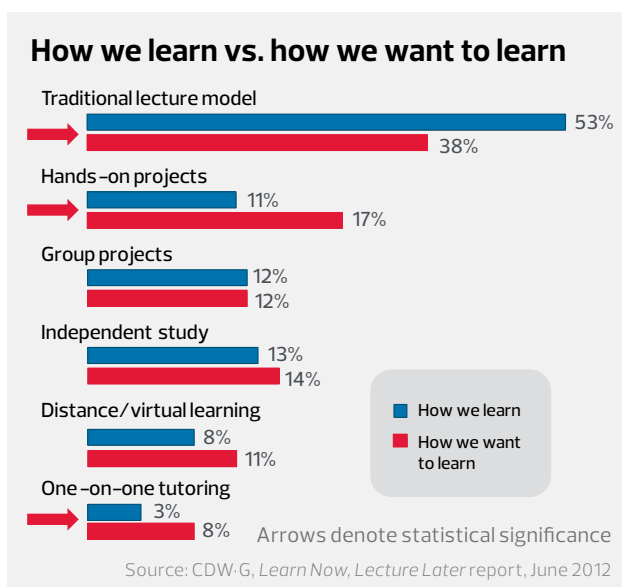
"It makes the learning real," one student says. "You are able to take the concepts you learn in lecture and use them in real hands-on situations."

Students Seek a Mix of Learning Models

Students say the use of classroom time is moving in the right direction, but they want greater flexibility and variety in how they learn.

While 53 percent of students currently learn through traditional lectures, only 38 percent want to learn that way. That suggests the remaining 62 percent want to learn through hands-on activities, group projects, independent study, distance/virtual learning or one-to-one tutoring.

Today, just 23 percent of students say they are very satisfied with the way faculty spend class time. The students who are most satisfied say they listen to fewer lectures and use more technology in class. In fact, the survey found that the most satisfied students are using technology when they are doing independent study, hands-on learning exercises, group projects and distance/virtual learning.



Students also say they learn more when faculty use multiple learning models in class. “[A better mix] allows me to learn the material in multiple, distinct ways and helps teach me how to reach the answer through different methods, such as communicating with classmates and/or researching the answer in topic-specific databases,” one student says.

For example, Oro Grande School District, which has three schools in Oro Grande, Calif., uses multiple teaching methods to meet its students’ needs.

The district’s alternative high school offers independent study and an online curriculum for students who prefer to work at their own pace and work individually with faculty.

Meanwhile, its elementary school and K–12 charter school focuses on project-based learning. Teachers still lecture when they are introducing new ideas and concepts. But they keep the lectures short and spend most of their class time on hands-on learning exercises and group projects that tie into state standards, says Michael Andreasen, the district’s director of IT.

“Sometimes when a teacher is presenting a new topic, the teacher will be up there in front of the class to present an idea, but we try to keep that to a minimum,” he says. “A lot of what they learn is more collaborative. They learn with each other, and the teacher goes around the classroom and facilitates that learning.”

At the college level, Michigan State University professor Ken Frank also takes a hybrid approach to teaching his statistics class in the Department of Counseling, Educational Psychology and Special Education.

He lectures first, then in the second half of class, he directs students to work on lab exercises or conduct review

sessions on their own or in small groups. Frank walks around and answers students’ questions.

During the lab exercises, he gives students case studies and asks them to solve problems using statistical software. If students get stuck, they can watch previously recorded videos of his lectures. For the past eighteen months, Frank has used lecture capture equipment to record his classroom lectures and has posted them online, so his students can access them anytime.

“Many of these students are not statisticians. They want to be social scientists and statistics is a new language for them, so having the ability to engage my lectures and presentations multiple times with video is really key,” he says. “They get a feel of the symbols and techniques.”

Frank believes it is important to lecture because the material is complex, but he also sees the benefit of mixing it up in class. So he’s not lecturing straight through. During the review sessions and labs, students are learning cooperatively, he says.

“You use technology for social learning and social opportunities,” he adds. “When three people watch a video and one student says, ‘I don’t understand what he means,’ another student can say, ‘I think what he means is this.’”

If students are still confused after reviewing video and discussing among themselves, Frank goes over the material again.

Instructors Flipping the Classroom

As mentioned earlier, some K–12 teachers and college faculty are flipping their classrooms, where they record and post videos of their lectures.

With this teaching technique, students learn their lessons by watching the recordings of lectures on their own time at home. Then, at school, they do their actual homework in class with the teacher available to answer questions. This flipped approach also frees up class time for collaborative activities, such as class discussions, group projects or labs.

Flipping a classroom is not a new concept, but it’s growing in popularity because technology makes it easier for educators to do it. In the past, the low-tech way to flip a classroom was to have students prepare for class by reading their textbooks, and then when students come to class, the teacher holds a discussion session, says Casey Green, founding director of The Campus Computing Project.

“It sounds like a unique model, but it’s a technology-aided extension of what has gone on for years,” Green says.

“The prerecorded lecture material is – much like the consumer world – on demand. It puts the learner in control

of the content, and it can mean higher-level activities in class. You've seen the lecture, now let's talk about the lecture or apply what you've learned in a lab."

Telepresence on the Rise

Schools are increasing their use of telepresence, video conferencing and web conferencing. Today, 33 percent of students and 31 percent of faculty have used video and web conferencing in their classrooms. Of those, 42 percent of students and 30 percent of faculty say they use it at least once a week.

Thirty percent of students want faculty to incorporate more video or web conferencing as a learning tool.

The technology allows faculty to bring in guest lecturers from anywhere in the world. Students who were surveyed say they use video or web conferencing software to work on class projects together when they can't meet in person.

Also prompting the move to flipped classrooms is the fact that nonprofit organizations such as the Khan Academy are posting K-12 lectures online and that numerous universities and colleges are posting their professors' lectures online, making them freely available to anyone in the world.

Stacey Roshan, who teaches upper school math at the Bullis School in Potomac, Md., started flipping her Advanced Placement (AP) Calculus class two years ago when she realized she didn't have enough class time to answer her students' questions.

"I constantly felt like I was trying to get through the material as fast as possible, so I could answer questions at the end of class. But it felt like I never had enough time," Roshan says.

So she flipped her classroom. With a tablet PC, she records 20-to-25 minute video lectures. Each semester, her students watch about three videos a week as their homework. During class time, she assigns them calculus problems, which in the past was their homework. Students can work alone or in groups. Roshan roams around the room, listens in on discussions and helps students when needed.

The flipped approach has been successful. It has increased collaboration, improved students' comprehension of calculus and has resulted in higher AP scores, she says. "Moving teacher-driven activity outside of the classroom and devoting classroom time to problem solving allows students to get help from their peers and teach one another. And if it's something they can't get, I'm always there to help and guide."

Students and Faculty Desire More Technology

Even though high schools and colleges are incorporating more technology into the curriculum, 69 percent of students would like to use even more technology in their classes. In addition, 76 percent of IT professionals say faculty requests for classroom technology are up over the past two years.

To help update their teaching styles and move away from lectures, high school and college instructors say that the three technologies they want the most are notebook computers/netbooks, tablets and digital content.

The top technologies that high school students want to use for classwork are similar: mobile computing devices (notebooks and netbooks, tablets, and smartphones), digital content and recorded class lectures.

Port Huron Area School District in Michigan is focusing on all those technologies as it transitions to project-based learning and other interactive teaching methods. In fact, during the 2012-2013 school year, several teachers will pilot the flipped classroom and blended learning approach, where students learn online part of the time and in the classroom part of the time, says Mark Washington, the district's director of technology.

Through grants and its own IT budget, the 17-school district has purchased 1,100 tablets, 850 netbooks and 800 new desktop computers during the past two years. And with Wi-Fi recently installed, the district also allows students to bring their own devices to school.

"The big trends for us are project-based learning and differentiated instruction," he says. "These devices will allow us to select what applications best fit individual students. As more devices and resources become available, they will help us customize instruction for our students."

Moving forward, Washington plans to move away from traditional print textbooks and use more digital content. About 100 of the district's 550 teachers currently use a learning management system where they can provide educational resources online, such as web links and reading materials.

The district is also virtualizing its software, making Microsoft Office and educational applications available over the web on any computing device. That will allow students to access educational materials and applications when they are at home. "Our ultimate goal is if we can extend learning beyond the classroom walls and reach them where they live, it will enhance their education," he says.

Tablets Are Taking Off

Tablets are as popular in education as they are among consumers. Today, 26 percent of students and 34 percent of faculty have used tablets in class.

Those with access to the mobile devices use them often: 71 percent of students and 75 percent of teachers say they use their tablets at least once a week. But students want to use the devices even more. Nearly half of all students (47 percent) want faculty to incorporate tablet usage more in their classes.

Students and faculty say the form factor is convenient. "I keep my course notes on the tablet and lecture from it," says one faculty member who was surveyed. "Occasionally, I will display material from the tablet via projector."

Students who were surveyed say their tablets can store their books electronically and that they have apps to capture lecture notes. "I carry less now that everything is with me on my tablet at hand," one student says.

Other students say tablets serve as a desktop or notebook computer replacement. "My school gave everyone tablets this year. We do much of our work — papers, projects, etc. — on it and e-mail them to our teachers," says another student.

At Cleveland Elementary School in the Port Huron Area School District in Michigan, every teacher and nearly every student was equipped with tablets last May. Teacher Kathleen Cilluffo's fifth-grade students used the devices to do online research, watch short educational videos, play educational games and complete interactive simulations.

Last school year, she used two exploration-themed simulation games on the tablets. "They led to a greater understanding of both the European trek to America and settlers' westward expansion," she says. "It was far more effective to use the simulations in conjunction with the textbook than to simply use the textbook alone. There's greater immersion."

In higher education, the technology wish list for college students is slightly different. According to the survey, the technologies they want to utilize the most are recorded class lectures, notebook computers/netbooks, digital content and learning management systems.

Lassen Community College, in Susanville, Calif., is investing heavily in those technologies. This past summer, the college finished equipping each classroom with interactive whiteboards, projectors and document cameras, allowing faculty to spice up their classes with multimedia content.

Lassen also furnished tablets to ten instructors this past summer and will invest in lecture capture technology in

fall 2012. Both technologies will allow faculty to record and post videos of their lectures and experiment with flipping their classrooms, says English and speech professor Cheryl Aschenbach.

"We want to be innovative in our instruction," she says. "Instead of a plain classroom, we are giving faculty a lot more technology tools. It's about faculty exploring new possibilities and creating an active learning environment."

Last spring, the college offered nine online courses and hopes to increase that count to 90 full or hybrid classes within two years, Aschenbach says. Over the next year, administrators will encourage faculty to put more course content onto the learning management system.

"Students don't want us to be teaching the same way we did 10 years ago," she says. "Technology is always changing, so teaching has to be innovative and constantly evolving."

Teaching with Classroom Technology Going Forward

This section explains the challenges school districts and colleges face in transitioning away from the lecture-only model and shares suggestions on how to successfully implement new learning methods.

Implementation Challenges

Overall, 88 percent of faculty see challenges in moving away from traditional lectures. Lack of budget is the greatest roadblock, according to faculty and IT staff, but other instructional and infrastructure challenges also hinder the transition, including size of classrooms and lack of access to classroom technology, professional development and technical support.

To assist with tight budgets, school districts and colleges can apply for state and federal grants. But to sustain a technology effort, schools must also prioritize technology in their budgets, says McConnell, the educational consultant. For example, schools can reallocate funds from print textbooks to help pay for technology, such as online materials, he says.

Lassen Community College has dealt with budget cuts the last few years, but the college has managed to upgrade its technology by taking a phased approach and by augmenting its own tech budget with grants.

Two years ago, the college reprioritized its budget to update its IT infrastructure. The IT staff installed new blade servers, server virtualization, voice over IP and a wireless network throughout campus, says IT specialist Elaine Theobald.

The college also networked each classroom, providing faculty the choice of an Ethernet connection or using wireless in their classrooms. Then, a year-and-a-half ago, the college provided notebook computers to each faculty member.

Then, in 2011, Lassen secured a Title III grant to pay for needed classroom technology and professional development. A team of faculty and administrators worked together to prepare the grant proposal. The process was time-consuming, taking about six months, but it was worth the effort, she says.

"Technology is so critical at this point in time, and with budgets for education scaled back, there is nothing left for new projects or expensive initiatives. So supplementing our tech projects with a grant was critical," Theobald says. "Without it, we would have accomplished only a fraction of what we did."

Faculty Need Professional Development

Besides providing faculty with technology tools, high schools and colleges need to invest in professional development to help instructors integrate technology into their classes and pursue alternative teaching models.

Over the past two years, 76 percent of IT professionals say they have received increased faculty requests for help with technology integration and related professional development.

More specifically, most high school teachers and college professors want training on specific technologies in their classrooms, but some also want training on instructional software, guidance on how to integrate technology into their teaching and guidance on using technology to teach 21st century skills.

When faculty were asked how their school district or higher education institution could help them become more comfortable or proficient with technology, they answered in the following ways:

- "Allow more innovative assessment measures and define learning outcomes instead of exact material to be covered."
- "Fund attendance to professional meetings that focus on the use of classroom technology."
- "Give teachers more software and virtual storage space. Eliminate roadblocks. Improve IT."
- "Hire technology coaches that meet with teachers and come into the classroom to assist teachers who are interested but uncomfortable with technology."

From McConnell's experience, about 10 percent of instructors are typically early adopters and immediately embrace using technology and changing learning models. Another 10 percent of teachers refuse to change and will not budge. And the remaining 80 percent in the middle want to change and understand they need to change, but require guidance on how to do it.

Don't focus on the 10 percent who refuse to change because they dominate the conversation and pull the culture back toward them, McConnell advises. Instead, schools should focus on the 80 percent, train them and have the early adopters mentor them.

"If you get 15 to 30 percent of them to change, you will change your culture and that will become the norm," he says.

Digital Content Use Grows

Digital content, which includes electronic textbooks and other class materials online, continues to gain traction.

Today, 69 percent of students and 73 percent of faculty have used digital content in their classes. Of those who report using digital content, 62 percent of students and 68 percent of faculty say they use it at least once a week. Another 48 percent of students say they want faculty to incorporate more digital content in their classes.

Teachers say they post PDF files, lecture notes and podcasts or videos of their lectures online. "In most of my classes, we read from a variety of books and journals," says one student who was surveyed. "Rather than buying 10 books, we access digital material and either print them or read them electronically."

Many school districts and colleges already emphasize professional development. At Oro Grande School District, teachers receive two weeks of professional development before school starts in August, in addition to training opportunities throughout the year, says Colin Opseth, director of IT for the district's elementary school grades.

The IT staff provides tech training on everything from using various educational software to using interactive whiteboards effectively in the classroom. But teachers also collaborate and share their best practices with each other, he says.

District administrators, principals and curriculum department staffers also provide training on how best to implement project-based learning and managing classrooms in that new learning environment, says Andreasen, the district's director of IT for sixth through 12th grade.

"Project-based learning is very different from what you learn when you get your teacher's credential," he says. "So we have to make sure teachers are comfortable with the project-based learning environment. You have to welcome communication with students, collaboration and sharing of ideas. It's a big shift from a traditional classroom."

At the college level, Lassen Community College is making a big push to provide professors the training they need to take advantage of the new classroom technology it has invested in.

"We can have all this new technology, but without professional development, they are not going to use it and it will just sit there," Aschenbach says.

In May, Lassen opened the Training Education and Collaboration Center, where IT staff and outside experts will train faculty on how best to use educational technology, says IT specialist Theobald, who runs the center.

The college is also creating faculty workgroups, where they share best practices and lessons learned with their peers. Earlier in 2012, instructional technologists at California State University, Chico used webinars to mentor 10 Lassen instructors on how best to design online courses and take advantage of learning management systems, Theobald says.

This fall, Lassen is creating more workgroups where the 10 online instructors will mentor other faculty members on how to put materials online and develop hybrid courses. Aschenbach envisions another cohort where faculty members discuss how to create more active learning opportunities for their students. "It's about training within and using our own resources to create an engaging environment for our students," she says.

IT Infrastructure Improvements Are Key

To increase technology in classrooms and pursue alternative methods of teaching, 87 percent of IT professionals say they need to first upgrade their institution's IT infrastructure.

More specifically, IT leaders feel they need to add or upgrade their servers and storage equipment and their network infrastructure, including Wi-Fi networks. Also high on their priority list are deploying cloud computing, improving security, installing virtualization and collaboration technologies.

For example, before it invested in new classroom technology, the IT staff at Port Huron Area School District upgraded the IT infrastructure first.

To date, the IT staff has upgraded and virtualized most of the district's servers and has replaced old networking equipment, boosting bandwidth speeds from 10/100Mbps to 1Gbps at each school site. The district also extended Wi-Fi to each campus.

"You can't teach with technology unless you have the resources to match," says Washington, the district's director of technology. "We no longer have network performance issues. With our new wireless network, kids can use technology and staff can get online."

Recommendations

Here are four suggestions for educational institutions to successfully move forward in their efforts to improve education with technology.

1. Get to the heart of what students and faculty want.

Understand the technology that users already have, how they want to use it in class and how they best learn and teach.

2. Consider how to incorporate different learning models.

Work closely with faculty to meet their subject-area and curriculum needs and personal teaching styles.

3. Explore how technology can support and enhance learn now, lecture later.

As faculty experiment with new learning models and technology in class, allow them to consult with each other and share best practices.

4. Support faculty with professional development and support IT staff with necessary IT infrastructure.

Unless faculty are comfortable, the change to new learning models will be slow. And without proper IT infrastructure, the change may not happen at all.



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