

# Northern Arizona University

FLAGSTAFF, AZ

CASE STUDY | EDUCATION

## → Challenge

Build a highly flexible, highly advanced learning studio on Northern Arizona University's Flagstaff campus, available to any professor who wishes to explore more engaging teaching methods.

## → Solution

Crestron DigitalMedia™ 4K solutions, AirMedia™, Crestron RL™ and Crestron control technology.



## Collaborative Classrooms: What We've Learned

*Northern Arizona University's Cline Library takes a new look at active learning to build a prototype classroom*

It's no longer enough for a university library to only offer books and a place to study. Today, it's a technology resource and a meeting center – even a site for prototype classrooms available for use by every department on campus.

"There's pressure on every university today to find more compelling ways for students and faculty to engage with course content and with each other," explains Jill Friedmann, Assistant Dean for the Cline Library, who recently headed a team responsible for creating an advanced active learning classroom, or learning studio, in the library.

Today, a large number of universities are building this type of classroom, where students can work in groups, exploring the subject matter in more detail, and then sharing their findings in a small group setting.

There's a great deal of supporting evidence that collaborative classrooms enable students to engage more, attend class consistently, learn crucial communications skills, and retain more of the subject matter. Still, a consensus has yet to emerge about how such a classroom should be laid out and equipped, or what teaching methods can be most effective there.

Exploring those questions is the goal of the new Cline Library Learning Studio, which uses Crestron 4K collaborative technology as the backbone of its advanced teaching and learning systems.



## Building a better learning studio

The new learning studio is actually the second on the university's Flagstaff campus, and like the first at the School of Communication, its collaborative technology was designed and installed by Andy and Charlie White of Flagstaff-based automation integrator AVDomotics.

"We spent more than a year helping the library plan the new classroom, although we knew, from the beginning, that it would have a Crestron infrastructure," Andy White explains. "The premise is much the same as the earlier space, but here, there are many more options. We have much better wireless connectivity. It will be even easier to update, and it uses 4K video."

"The idea is that a faculty member can come in and do anything he or she can imagine," Friedmann adds. During the research phase of the project, the Learning Studio team found that instructors were frustrated with current classroom technology because it was difficult to use, and it required an understanding of how the technology actually worked to fully utilize it. Jeff Hillock, the technology lead on the project explains, "The Learning Studio control interface was designed to simplify the user experience by presenting the functions of the Learning Studio as activities, rather than as a set of connected electronic components, so the user only needs to know what 'activity' they want to do. Everything that could be automated was programmed to happen behind the scenes, allowing the user to focus on their content, rather than selecting inputs and outputs. For users that want even more

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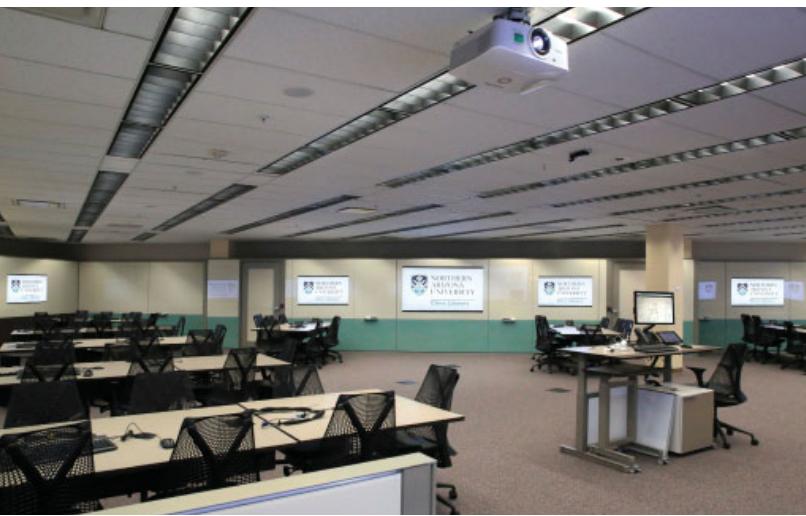
Building this system was like building a high-performance automobile. There's a reason why, if you're racing around a track at 200 miles an hour, you use only the best components."

— Andy White

*AVDomotics, Flagstaff*

control over the room, granular device control is available via an easily accessible persistent sidebar."

So far the Cline Library Learning Studio has been used for classes in science, geography, engineering, cinema, honors seminars, economics, and a "BizBlock" session team taught by management and marketing professors. "The classroom is open to anyone on campus, but they must be teaching a class with at least 50 students, and we ask that they use the technology installed in the room," Friedmann explains.



The Learning Studio, which is triangular shaped, does not look like a traditional classroom. The instructor's podium is placed roughly in its center, because there is no front or back to the room.

The floor and walls consist of modular units from a company called DIRT<sup>®</sup>. The floor provides access to power and Ethernet. Behind the walls is an 18" air space in which flat-panel displays are hung and equipment and cables are installed. The DIRT<sup>®</sup> wall units include a floor-to-ceiling glass surface, which allows students to write and draw with markers anywhere, even over the displays.

There are ten modular tables, created by Request Manufacturing for Goodmans Interior Design in Phoenix. Each of these can seat seven students, or they can be broken into two tables, thus providing seating for 20 groups of three or four students. "We can also combine the moveable sections," Friedmann says, "so if a professor wants larger groups for a particular activity, that's possible too."

For each of the ten combined tables, there's a Planar<sup>®</sup> 55" display embedded in the modular wall, plus one Crestron FlipTop<sup>™</sup> Touch Screen Control System and one standard Crestron FlipTop push button control system (for users who need more tactile control), AC outlets, and HDMI<sup>®</sup> connections for seven student laptops and other devices. There's also a Crestron AirMedia<sup>™</sup> hub, able to connect wireless devices, including tablets and smart phones, into the display system. Friedmann says that very often students connect wirelessly, but the wired inputs are especially useful for film classes where instructors are



streaming high-definition or 4K video and require more bandwidth.

In addition, there's an 86" Planar 4K display and two Digital Projection<sup>®</sup> E-Vision projectors with drop-down 110" screens. There is a Crestron DM-MD6X4 switcher at each table, for switching within each group, and a DM-MD32X32 switcher for the classroom, which allows instructors to send any signal from any student or instructor device to any combination of projectors and displays. The entire system is 4K compatible, and Friedmann expects to switch out the table displays for 4K units in two or three years, when 4K content is more prevalent.

## A high-performance instructional space

In choosing technology for this classroom, Friedmann says the design group had two crucial criteria: it must be very flexible and very easy to use. "We have the luxury of a great support staff to help in the room, but we didn't want them there all the time walking faculty members through the system. Our goal was to build a high performance technology classroom that required little to no staff support."

The writable glass walls are an important feature, since there's evidence that group learning is enhanced when members stand and physically interact with each other and a writing surface. Instructors use the writable walls in innovative ways. For example, in an introductory geography class, the instructor will ask freshmen to draw maps of the campus from memory on the walls,



then bring up the official map on the displays next to their work. "In the BizBlock class, students have drawn all kinds of graphs on the writable glass by hand, learning the basic concepts before turning to the computer to generate them," Friedmann says. Students often photograph these hand-drawn graphics with their smart phones. AirMedia, which provides wireless connectivity into the switching and display system, makes it easy share them with the class.

Laptops or tablets are more appropriate when students have to do research to complete an assignment, when they have to watch video or listen to audio files, or when they need to incorporate text, charts, or images into a presentation. "The students are all about media, so it's very natural for them to use technology in this way," Friedmann says.

In addition, there's a Crestron RL™ video conferencing system (based on Microsoft® Lync®), a Blu-ray™ player, a Wolfvision document camera, a sound system using two Shure® boundary mics on each table, plus a Shure wireless lavalier for the instructor and amplifiers, audio processing and ceiling speakers, and a Listen Technologies™ LS-16 Assistive Listening System.

Charlie White says making this large and complex classroom simple to use took some careful planning. "We created two methods of controlling the room. One is a simple wizard where you choose what you're doing next and let the system set the room up. The other is a map of the classroom, where you can be very specific with which devices go to which displays just by touching the source and then the outputs on the map." Instructors can access the wizard or the map from a 12"



Crestron touch screen built into the podium, or from an iPad® equipped with the Crestron app.

"It's all about the activity," Friedmann adds. "The key to controlling the room for faculty is how they want to use the room on that particular day. Are they going to have students work in groups, bring in a guest speaker, start out showing something from their computer, or show a DVD?" The room interface is based on those actions, so all they have to do is select a button, and the room sets up all the technology to fit their needs. "There's no language like 'sources' or 'outputs' here. And moving between actions, which happens a lot in a dynamic classroom, is quick and simple too. The instructor just goes to the home screen and picks a different action, such as 'Group Work' or 'Document Camera,' and the room technology adjusts everything behind the scenes."

Andy White says there was a third requirement that turned out to be crucial as well. "We felt the switching in the room had to be instantaneous," he explains. "Imagine you're in a heated class discussion, and the professor says, 'Let's pull up what Group One found.' She pushes a button and you wait five seconds, 10 seconds, and everything stops. The slide comes up, you talk about it, then you switch to something from Group Two, Group Three, Group Six. In this situation even a one-second delay would be too long. You'd lose the attention of your students. And we know too that, if something is cumbersome, people don't use it."

Saying you want instantaneous switching and achieving it, however, are two different things. "There are two reasons why we had to use Crestron technology in this room," White explains. The first was its flexibility.



"It would be really hard to create the control screens we needed with anyone else's product," he says. The unique power of DigitalMedia was another.

"There are at least half a dozen ways to distribute video, but not if you're doing 4K with a large switching matrix," White adds. "Building this system was like building a high-performance automobile. There's a reason why, if you're racing around a track at 200 miles an hour, you use only the best components."

## Lessons learned

The library worked with faculty partners to conduct an assessment project during the first semester of instruction in the Learning Studio. The assessment used a variety of measures, from surveys and interviews to support group incident reports and student performance data, to assess goals and outcomes across eight classes taught in the room.

Key findings included:

- The classroom encouraged high levels of student and faculty engagement and enrichment.
- Students and faculty agreed that the room is a highly flexible space that promotes collaboration and active learning and teaching.
- Student learning improved in the new classroom compared to a traditional classroom space, although the improvement might be attributed to a blended course design rather than the classroom itself.

- The majority of faculty responded that the classroom engaged them by promoting discussion, encouraging their interaction with students, helping them to develop connections with students, and engaging them in the teaching/learning process.

While faculty are free to use the room as they see fit, Friedmann says they have worked hard to use teaching methods far more collaborative than the traditional lecture. "There's a completely different atmosphere here, with far more interaction between the faculty and students, and the students with each other."

The space has proven very popular, with more professors asking to use it than can be accommodated. Still, Friedmann expects other departments to incorporate the technologies and teaching methods they have experienced in this room, as they build or remodel their own classrooms. "We're giving them the chance to try out various types of technology and take away what's most important for their own classes. It's been a great opportunity to see what they can do."

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**More about the project**  
See the Cline Library Learning Studio web page:  
<http://nau.edu/library/learningstudio>  
See the DIRTT website:  
<http://www.dirttmarketing.com/freshdirtt/issue/298/issue.pdf>

**Photos courtesy:** S. Dio, Cline Library (page 1); Jill Friedmann, Cline Library (page 2, page 3 image on right, page 4 on left, and page 5.) All others: Northern Arizona University.