

➔ Challenge

Create a collaborative classroom to amplify the benefits of flipped classroom teaching methods.

➔ Solution

Use Crestron collaborative technology, including DigitalMedia™, AirMedia™ and the Crestron Connect It™ tabletop presentation interface, to promote the exchange of ideas and solutions.



Doing the Flipped Classroom One Better

University of Florida finds flipped classroom methods and collaborative technology a powerful combination

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Is the traditional lecture an endangered species? Maybe not, but a recent study at the University of Florida College of Engineering suggests there are better ways to teach today’s technically savvy college students.

Concerned with poor attendance and uninspired performance among many of their engineering students, four professors from the Department of Electrical and Computer Engineering at UF tried an experiment. They taught one *Circuits I* class using traditional methods, where students listened to a lecture in a large auditorium, and then went home and did their homework. The following semester they taught the same class but used the flipped classroom method, asking students to watch the lectures online, and then come to class to work in small collaborative groups, exchanging ideas and solving problems, essentially doing their homework together.

The results were undeniable. While only 56% of the beginning engineering students taught traditionally received a grade of “C” or better, 83% of the flipped classroom students did the same—a nearly 30% improvement that also reduced the number of students who dropped the class from 28% to just 2%.

And then the college went one step further. With a nod of approval from the UF Office of the Provost, they used the very latest Crestron collaborative technology to design a classroom that allows students to use their own laptops and mobile devices to exchange ideas, solve problems together, and make presentations to the entire class, using the very technology and skills they will find in the working world.



Framing the discussion

There's no denying that today's college students have a level of technical sophistication unseen in previous years. It makes sense that universities would build on that skill to create a robust learning environment for this Bring Your Own Device (BYOD) generation.

Using an empty 2,000 square foot classroom in the new engineering building, the UF Information Technology Installations group, at the behest of the College of Engineering's Ron Wisener, installed ten collaboration tables, each equipped with two flat screen monitors, a dedicated computer, microphone, and seating for six students. Students can also connect their own devices using a Crestron Connect It cable caddy, one of which is installed at each seat, or using the AirMedia IP Gateway. Connect It offers an AC outlet, HDMI® and VGA connections, and two LED-lit buttons that correspond to the two table monitors. AirMedia allows students to connect wirelessly. Using a 7" Crestron touch screen, the students can easily switch between the dedicated computer and their own devices.

The instructor has master control of the room from a 20" Crestron touch screen installed on the lecturn. Choose "Instructor Mode" and s/he can send images from a document camera, a dedicated PC, the instructor's own laptop or mobile device, or a 70"

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— **Bill Strupp**

Crestron Electronics

interactive whiteboard to all of the students' monitors.

“I'm kind of framing the discussion for them,” says Dr. Bruce Carroll, who teaches a junior level fluid mechanics course in the new classroom. Students first watch his lectures online, and then come in twice a week for a meeting of the minds. “I give them a problem to work on and set up the discussion, but then they interact with each other.”

When Carroll switches to “Collaboration Mode” on his touch screen, students are free to use the technology at each table for their group work. When a group is



ready to present, or if Carroll sees something on a group's monitors he wants the whole class to see, he simply takes command again with his touch screen and displays that content on every monitor in the room, making that student the presenter.

"Sometimes I just kick back and listen to their conversations," says Carroll. "If I hear them saying something wrong, I might walk over and explain it." With the help of two teaching assistants, he can run collaborative sessions for up to 60 students physically in the room, while additional students can connect from home through the school's web conferencing program, The Big Blue Button.

While Carroll embraces all the options that the room's technology makes possible, some other instructors use the room in more traditional ways. Either way, they can record their lectures and post them online for those who missed class or who may wish to review material that was covered in a class. A push of a "record" button on the instructor's touch screen activates a Crestron Capture HD® device. Recordings are then posted automatically to UFL's Big Blue Button server.

While the new room is simple and intuitive to use, this was not an uncomplicated system to design and install – a task that fell to the university's Senior Engineer and Project Manager Lon Vance. "Using

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— Ron Wisener

University of Florida Engineering

Crestron equipment, we were able to design a simple-to-use collaboration table with multiple inputs for each student, with the ability to transmit video to and from the instructor's station," says Vance. With so many sources to choose from, Vance says the biggest overall challenge was switching. He chose a Crestron DigitalMedia 32X32 switcher as the foundation for the system because of its affordability, expandability, and fast switching speed.

"For an extremely complicated room, it really gives them a lot of flexibility," says Crestron Market Development Manager Bill Strupp. "I haven't seen a university create a classroom this comprehensive before. The capabilities of this room are beyond measure."



At left: 20" touch screen with the instructor's controls
Above: 7" touch screen with student controls

Nothing but great things

Most instructors will tell you that 300-plus students looking down on you in a large lecture hall is an impersonal setting at best. "A lot of faculty complain that, with these large lecture classes, attendance is just pathetic," says Carroll. "In most of them, less than half the students actually come to class." Because Carroll always takes attendance, he knows that in his flipped collaborative classroom the average is about 95%.

That figure may reflect another finding of the UF professors who conducted the *Circuits I* teaching experiment. When they polled students who completed the flipped version of the class, 104 of the 106 who completed the survey said they preferred that teaching method.

With the construction of the collaborative classroom, the university improved on these already very positive results. Professors, such as Carroll, are citing better grades on exams, more social interaction among students, and increased personal time with instructors as all playing a part in their success.

"The overall consensus is that students really enjoy learning in this space," Technology Coordinator Ron Wisener adds. "As a result, the room is constantly booked."



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Photos courtesy the University of Florida