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Mightier Than the Pen Alone

A computerized system enables students to view course lectures alongside their own notes

By Vincent Kiernan
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Yvette Cottman had a rough semester last fall. A sophomore nursing student at Coppin State University here, Ms. Cottman found herself hospitalized while trying to complete a key introductory course in nursing.

She missed some lectures altogether and struggled with material from lectures that she had attended.

But Ms. Cottman was able to watch digital recordings of those lectures using a system that merges video recordings of class lectures with a digital version of a student's own notes. On her home computer, she could call up a precise segment of any lecture, at any time of the day or night.

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"You can go back and listen to the lecture again," says Ms. Cottman, who watched some lectures from home while recuperating from surgery. She passed the class and during January, after returning to the classroom, used the system again, in a course on determining proper doses of medication.

Other students at Coppin State like the system, too. "If I'm in my bed, I can listen to the lecture," says Nichelle Neely, a sophomore nursing student, of her experience in the introductory nursing course. "If I'm folding clothes, I can listen to the lecture."

Administrators and faculty members at Coppin State, a historically black college with many nontraditional students, believe that the technology will improve student performance, reduce the dropout rate, and make it easier for students with outside demands such as full-time jobs to handle the stress of college.

Such prospects have led to success for several companies that make systems for capturing and delivering video recordings of lectures and integrating them with PowerPoint slides and other supporting materials. Sonic Foundry, for example, offers an online directory of hundreds of such recordings produced at universities and companies with its software, called Mediasite. In August, Horizon Wimba acquired the assets of Silicon Chalk, which makes software that merges a live lecture with a lecturer's notes; the system can record the lectures for later use by students. Anystream's Apreso Classroom software combines a video recording of a lecture with visual aids used by the professor.

The system at Coppin State, sold by **Tegrity Inc.**, is unusual in its use of an electronic pen along with digital recordings. About 40 colleges have licensed **Tegrity's** full system for recording sessions of at least some courses and delivering them online with either electronic note taking or podcasting. More than 300 other institutions are using the technology on a more limited scale. They include Colorado Technical University, the Georgia Institute of Technology, and Santa Clara University.

"It is an incredible tool," says Sadie R. Gregory, Coppin State's provost.

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How It Works

In the **Tegrity** system, a professor uses a camera to record a digital video of every lecture in the course. Meanwhile, students take notes using the electronic pen, which records a digital copy of everything the student writes and draws. The pen is bigger than the average pen, weighing 1.3 ounces. (A typical ballpoint pen weighs less than 0.2 ounce.)

To use the pen, students write in a special, spiral-bound notebook, which has paper pages covered with marks printed with an ink that is invisible to human eyes. As the student writes notes on the paper, an optical sensor in the pen detects precisely where on the page the note was written.

Later, the student uploads those notes to a laptop or desktop computer by placing the pen into an electronic holder attached to the computer. **Tegrity** software, running on the university's server, merges the notes with the lecture video and any other materials used by the professor during the lecture, such as a PowerPoint presentation. The student can see his or her notes on the computer screen along with the recordings and slides.

On a computer, the student can review the part of the lecture corresponding to any portion of those notes by simply clicking on the particular phrase in the notes with the computer's mouse. Or the student can click on a particular slide to jump to the portion of the lecture in which it was discussed. The student can replay the portion of the lecture, over and over again, if necessary.

The system works with a variety of course-management systems, including software from Blackboard and WebCT. The lecture recordings are played through the course-management software.

The recordings of the lectures can also be converted into videos that can be watched on the latest version of Apple's iPod. Each lecture is broken into several chapters, or portions, that center on one particular theme. That approach makes the audio and video recordings more digestible. "I'm not sure that students can listen to two-hour recordings," says **Isaac Segal**, president and chief executive of **Tegrity**.

Students can use the system to review notes that are unclear, or to fill gaps in their notes that occur when they are too mesmerized by the lecture to write anything down.

The average professor speaks 120 words every minute, while a student can write only about 20 words per minute, **Mr. Segal** says. That puts even the best note takers in a bind. "If they try to write more, they listen less," he says. "So there is an information gap."

Although one might expect that the availability of recorded lectures might lead to a drop in class attendance, professors at Coppin State say that turnout for their lectures hasn't suffered.

But Habtu Braha, a professor of management science and economics at Coppin State, says whether students attend his classes is beside the point. "What is important is whether the student learns what the student needs to learn," he says.

Coppin State and **Tegrity** have signed a five-year contract, at a modest cost. Coppin charges students what **Tegrity** charges it for the pens, about \$100 each. Licensing **Tegrity's** software costs the university about \$50,000 annually, says Ahmed M. El-Haggan, vice president of information systems and chief information officer at Coppin State.

The university bought two computer servers and extra computer storage to handle the data, at a cost of about \$30,000, he says. And anticipating that students might need help with the system at odd hours, the university signed a contract with another company, Presidium Learning Inc., to provide around-the-clock support for both **Tegrity** and the university's Blackboard system. That costs less than \$30,000 annually, he says.

"It's worth every penny we pay," says Mr. El-Haggan.

Growing Use

Coppin State first used the system in the spring 2005 semester. Ten faculty members used **Tegrity**, and feedback from students was positive, says Mr. El-Haggan. That semester, students were given a discount on the **Tegrity** pens if they would answer surveys about their experiences. Ninety percent said that the system helped them learn more in the course in which the technology was used.

In the fall 2005 semester, 24 faculty members chose to use the technology, in departments as diverse as computer science and English. This semester, 40 faculty members are using the system in as many as three course sections apiece, Mr. El-Haggan says.

And student demand for the recordings has been high. During the fall semester, students collectively watched a total of 780 hours of recorded video from 35 course sections, Mr. El-Haggan says.

The university does not require professors to record their lectures or otherwise use the system. Rather, Coppin State has encouraged voluntary use by faculty members by, for example, offering small grants to professors who want to revise their courses to take advantage of **Tegrity**.

Mildred M. Yarborough, who teaches the introductory nursing course that Ms. Cottman and Ms. Neely took, has done that. The ability to review video of lectures is useful, she says, in helping students review complex topics, such as how to compute drug dosages. "They can see me work out the formula and hear the instructions that I give at the same time," she says.

Emmanuel C. Anoruo, a professor of economics and finance at Coppin State, says he believes that his students who have used **Tegrity** have performed better in his classes than other students. So does Mr. Braha, the professor of management science and economics. There are no data to back up such claims, but Coppin State is providing small internal grants to faculty members who wish to study the technology's effectiveness.

At this point, faculty demand outstrips the university's ability to provide the technology and train professors. The nursing school has gone so far as to ask that the system be used in all its courses, a move that Mr. El-Haggan says the university is not yet equipped to make.

"The interest level is much greater than we anticipated," says Ms. Gregory, Coppin State's provost. "Now the concern is not will the faculty use it, but how can we keep up on the supply side and the administrative side."

At Santa Clara University, another institution using **Tegrity's** software, administrators remain committed to testing the technology, even though the results of early experiments have been somewhat more equivocal. The university has recorded audio of lectures in a few courses each quarter since the spring of 2005.

Only about 40 percent of the students in participating classes used the special pen to take notes, says Ronald L. Danielson, vice provost for information services and chief information officer at Santa Clara. "They don't see a lot of value in using the pen," he says.

Many of the other 60 percent viewed the recordings, but without using the pen to find the spot in the lectures, says Mr. Danielson. The students navigated to the right spot in other ways, such as by skimming through the lecture until the PowerPoint slide for the desired part of the lecture came up.

Mr. Danielson says he is not sure why student use of the pen is lower at Santa Clara. Some students said that they preferred to take notes in pencil, others complained about the lifetime of the battery in the pen, which generally needs recharging every five to seven days, and others complained that the pen was too big, Mr. Danielson says. Perhaps the Coppin State students feel more time pressure and so place greater value on the pen's help, he says. Or perhaps Santa Clara students feel more comfortable with computer technology so that they believe they can do without the pen.

Occasional Glitches

As is common with information-technology systems, **Tegrity's** system at Coppin State has suffered glitches from time to time, although Ms. Yarborough says that her problems have been mostly with the university's video equipment rather than with the software.

Erica Reid, a sophomore nursing student, recalls that she had some problems figuring out how to get access to the information in the introductory nursing course. "A lot of people were confused," she says.

Mr. El-Haggan says that the problem may reflect the fact that professors initially were trained only in how to use the system themselves to record and present lectures, but they were not shown how students would use the system to call up recordings. More recently, faculty members have been shown the students' side, so that the faculty members can help coach them in using the technology more effectively, he says.

Moreover, Ms. Gregory says, some students simply don't know how to take good lecture notes. Encouraging professors to include some instruction in note taking might help student performance as well, she says.

Ms. Neely, the sophomore nursing student, says that it is inconvenient that a student is allowed to load the **Tegrity** software on only one home computer. At other computers, the student can still call up the video, but without the student's lecture notes.

And the pen could stand improvement, students say. "I'd like for the pen to be a little smaller," says Ms. Reid.

But such problems are minor in light of the technology's impact on campus, says Ms. Gregory, the provost, who says the system has started a dialogue among professors. "They're talking about teaching and learning," she says. "That's wonderful."

Sidebar with photos: RELIVING THE LECTURE

Tegrity produces a digital video of every lecture in a course, merged with a student's own notes from the lectures. Here is how it works:

A video camera records the professor lecturing. Software also records PowerPoint presentations or other visual aids.

At the same time, the student takes notes with an electronic pen, which records a digital copy of everything the student writes and draws.

The student transfers the notes to his or her computer by placing the pen in a cradle connected to the computer.

Online, the student can watch the recording of the professor and the visual aids at any time. The student's computer adds an image of the notes that the student took with the electronic pen. The student can replay parts of the lecture as needed.

Reliving the Lecture

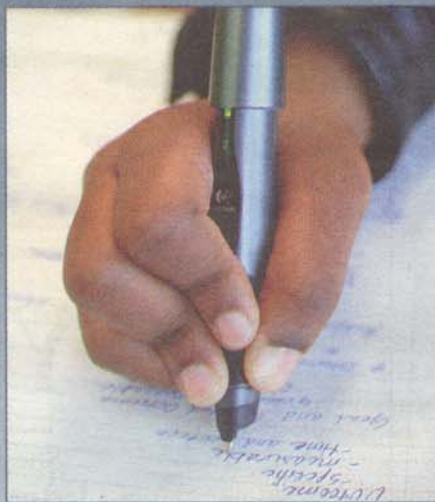
Tegrity produces a digital video of every lecture in a course, merged with a student's own notes from the lectures. Here is how it works:



Vaple Robinson, a nursing professor at Coppin State U., lectures in front of a camera whose digital recording of the class can be viewed later by students.



1 A video camera records the professor lecturing. Software also records PowerPoint presentations or other visual aids.



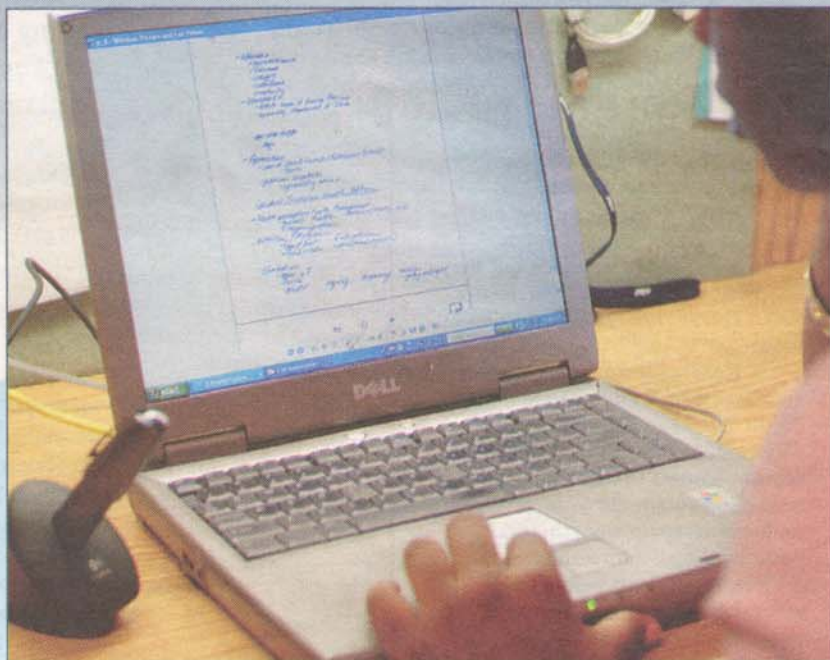
2 At the same time, the student takes notes with an electronic pen, which records a digital copy of everything the student writes and draws.

SOURCE: TEGRITY INC.



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