"My theory is that, if kids are using more than they thought, they'll be more prone to change their ways. This generation wants to be more sustainable," Howard says.

"When students can see the dollar amount saved by recycling per year, it really shocks them," agrees Gonska.

The students began work on additional initiatives—a draft environmental policy impact statement for DePaul, a job description for a sustainability coordinator, and ways to incorporate sustainability into the first-year curriculum—that they weren't able to finish by the end of the quarter. Both Montgomery and the SGA officers are looking at ways to maintain the momentum.

"We realized that it's more than just changing to energy-efficient light bulbs, it's getting people in the mindset of doing things green," Gonska says.

Diagnostic help for radiologists

Every day, radiologists across the country review hundreds of digital images—mammograms, CT and MRI scans and more. Their trained eyes spot the shadings and imperfections, called nodules, which are telltale signs of disease. The process is labor-intensive and time-consuming, with radiologists spending much of their time reviewing normal images.

That could change based on the work of faculty and students in the College of Computing and Digital Media (CDM). They're developing computer programs to help radiologists sort, prioritize, analyze and describe images more rapidly and consistently. The work has resulted in open source software and numerous papers and presentations at scientific and medical conferences.

Guided by CDM Assistant Professor Daniela Raicu and Associate Professor Jacob Furst, students have developed algorithms to quickly compare a patient's CT lung scan with scans stored in a database maintained by the National Institutes of Health (NIH). Instead of searching by keyword, the programs compare the features of the image to find similar images, a process called content-based image retrieval.

The results can be used in several ways. At the most basic level, the system can sort out potentially abnormal scans, allowing radiologists to focus immediately on at-risk patients.

Second, radiologists could use the system to provide a computer-generated diagnosis. Although there are other computer-aided diagnosis programs available, the CDM system goes into far greater detail. It can identify a number of characteristics of a suspect lung nodule, rank them in severity from 1 to 5, and display the probability of each, says Ekarin Varutbankul, a doctoral student.

"This makes it different from other computer-aided diagnosis systems, which tend to just provide the probability of cancer, but do not give the radiologist information about the characteristics and levels that led to that evaluation," he says. "Our system provides the predictive levels and characteristics so that radiologists can make the diagnosis themselves based on their knowledge and experience."

Alternatively, radiologists could submit questionable lung nodules to CDM's content-based image retrieval system. The system scours the database for other nodules with similar characteristics and presents the radiologist with all relevant scans and their respective diagnoses. The comparative data would help the radiologist make a correct diagnosis.

Either way, the system helps radiologists make more accurate diagnoses faster, says Furst. "A number of studies have shown that man and machine generally can perform better than man alone or machine alone," he says.

The project is complicated by the well-known fact that radiologists differ in both the language they use to describe abnormalities and their evaluation of any given nodule, says Bill Horsthemke, a doctoral student working on the project.

"By being part of a research lab, students learn to identify problems, brainstorm situations and disseminate their results through publications and presentations."

— Raicu

"Ideally, if we had just one radiologist, we could use semantic mapping to fairly closely predict what that radiologist would diagnose," he says. "In the database we have, scans have been reviewed by up to four radiologists. They often disagree by almost 40 percent."

Master's student Vesna Mitrovic is identifying the most representative sample for each of the 149 variations of lung cancer in the database, while Horsthemke is working to reconcile the varying terminology that radiologists use to describe each. In addition to refining the computer system, they hope to help the field of radiology extend and standardize its terminology.

"We've been having meetings with people at the NIH, at German, Swiss and Israeli universities and have been invited to write a book chapter," says Horsthemke. "It's been a real treat to be part of international content-based image retrieval development in the medical world."

Maria-Romina Hench and Ruhan Memishi contributed to this article.