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Physics = Idea x fun2

Wabash College class has taken a page from 'MythBusters' playbook and run with it

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CRAWFORDSVILLE, Ind. — Physics class at Wabash College is no longer boring.

Textbooks? Gone. Lab reports? Not necessary. And forget the lectures on velocity and collisions.

Students here ram their classmates into concrete walls, shatter wooden tables with 90-pound dummies and build fake torsos to mimic a famous Shakespearean murder.

All of it caught on tape, which is the only way to turn in an assignment in Physics 105.

"I didn't know this class was going to be making videos," said Matt Hudson, a senior and football team quarterback heading into sports broadcasting.

"I just assumed it would be a textbook class. But this has been far more interesting."

The videos -- posted on the Wabash YouTube page -- are filled with wacky stunts, edgy music and cool, slow-motion photography. All pieced together so viewers can follow the steps toward solving a scientific myth or question.

Sound like an episode of the Discovery Channel's "MythBusters?"

That's exactly what Professor Martin Madsen wanted when he rewrote the curriculum for the class designed for non-majors, mostly seniors needing to satisfy a requirement.

In other words, these guys -- and this is Wabash, so they are ALL guys -- are not huge fans of physics. But they do enjoy breaking things.

All in the name of science, of course.

"I didn't want this to be a memorization and recall-of-facts class," said Madsen, 34, a third-year physics professor. "I wanted to move away from lectures and lab books and toward more experimentation."

The seed was planted one day last year in the midst of a lunch-hour workout when Madsen saw his first "MythBusters" show from a treadmill. He was instantly hooked by the show's fast pace, humor and intriguing experiments.

"MythBusters" has been airing for seven years and has become a big hit for tackling is-it-true topics such as: Is duct tape strong enough to lift a car in the air or keep a boat afloat? Does a car always burst into flames when it plunges off a cliff? And is it even possible to leap from several stories into a trash bin, then run away?

The show uses basic physics formulas -- velocity equals speed plus direction -- on smaller-scale experiments, followed by life-size experiments using real objects and sometimes real people.

Madsen began to formulate a new class plan, one based solely on the program's format, but there were questions to consider and approvals to get. "The big question in my mind was: 'Can you present science in a video form?' " Madsen said. "And the answer, I think, is yes. We can use this as a tool to communicate science to a generation that is used to this format."

But would his boss, the head of the physics department, agree to a wholesale change like this?

It is not an adequate method of teaching for serious physics students who need to spend hours reading complicated theory and working out even more complicated equations. But for Physics 105 students, it was not a bad idea, said department head Dennis Krause, a 15-year physics professor and fan of the show.

"I thought it was an excellent idea," said Krause, who admits to borrowing elements of the show for his own advanced classes.

Forty students signed up for the first pair of classes offered this fall. They were divided into teams of five and given popular myths to explore through experimentation. Instead of buying a textbook, they purchased tiny, hand-held digital video cameras.

The teams spent 10 to 15 hours a week on their projects. They used the campus fieldhouse or outdoor venues to shoot videos. They recorded data on laptops and flashed the results on the video. They spent little time in the classroom.

"In this class, I do far less teaching than in any other course," Madsen said.

One of the first subjects explored was the way automobiles crumple: Do newer models crumple easier than older, heavier cars? Students began by crashing small objects such as beer cans and aluminum pans into a wall. Then they put on football helmets and pads, jumped on carts and rolled themselves into the wall in order to test velocity, impact and G-force.

A high-speed digital camera captured the action. The finished videos were graded, then posted on YouTube. It wasn't long before some of them caught the attention of the Discovery Channel's "Daily Planet" show, which featured one of the videos during a program on slow-motion technology.

Students also borrowed golf clubs and a Wabash golfer to see whether it's possible to drive a golf ball through a phone book. (Yes, on the Crawfordsville book, no on the Indianapolis book.)

They've tossed bowling balls high into the air to see whether a ball could crash through a wooden lane. (Depends on the wood.) And they've grabbed their skateboards to see whether it's possible to jump a parked car and land safely on the other side. (Yes, but it takes skill, and you risk injury and broken boards.)

All the while, they're using principles of physics to prove or disprove "myths." On the videos, they discuss their findings and show their work with chalkboards and laptop screens.

Nick Giordano, who heads the physics department at Purdue University, called the approach intriguing and appropriate for a generation of students whose curiosity has been piqued by television programs such as "CSI."

"I think this is a great idea for teaching physics," he said. "It shows students that physics is all around them and is not some highly theoretical or out-of-reach subject."

Even when the subject is murder.

One group included a student who had just completed a Shakespeare class and wondered whether a famous, gruesome murder of a character in "MacBeth" could really be done. Act 1, Scene 2 describes a battlefield victim "unseamed from nave to the chaps," or split in half.

Can that really be done?

The group concluded that, despite the ease of such a killing on stage (or on screen), the average human being wielding a weapon cannot generate enough force to successfully split a body in two.

"I think that overall, the students have gotten a grasp on the key concepts behind developing, analyzing and communicating an experiment," Madsen said. "They showed a desire to get the experiments done."