Nov. 5th, 2016 Meeting Abstracts

Active learning methods, and snafus that can spoil them by John Goree Dept. of Physics and Astronomy, The University of Iowa

I have adopted "flipped classroom" and "peer instruction" methods in two undergraduate classes at The University of Iowa: a large General Education physics class that is taught close to a high-school level, and a small intermediate-level course for majors.

Adopting a fully-flipped classroom has yielded a significant improvement in my exam scores. Students view several short videos before attending class. These videos replace the lectures I gave previously, thereby freeing class time for better purposes, such as examples and discussion. As a replacement for the passive experience of sitting in a chalk-and-talk lecture, I believe the flipped classroom can improve student learning at all levels, from high school to graduate.

I've formulated some easy ways for an instructor to make a transition from traditional lectures to the flipped classroom. These tips are presented on my YouTube channel https://www.youtube.com/channel/UCm9kzwSk259isFnCL2v1DWQ .

Technology has enabled these methods, but it has also enabled new ways of cheating and new ways of circumventing the intended instruction. Relying on clickers based on the cloud or wi-fi poses a particular problem, which I will remark upon.

The Ranking Task as Interactive Lecture Demonstration by Nate Quarderer

In my short career as a physics instructor, I have grown to rely heavily on ranking tasks as a means of introducing concepts, providing opportunities for class discussion, and assessing student understanding. Many of the scenarios described in Ranking Task Exercises in Physics (Okuma, Maloney, Hieggelke) can be carried out in the classroom with the help of equipment found in a typical physics lab, or demonstration stock room. Using a technique modeled after the Interactive Lecture Demonstration procedure (Sokoloff & Thornton), I have adapted my original approach to teaching with ranking tasks to include time for students to recreate their task of interest as a way of testing their predicted outcomes.

Using Moodle in the Physics Classroom **– Ian Spangenberg, Pleasant Valley High School, Bettendorf, Iowa**

Homework plays an important role in the physics classroom. Problem sets act as the requisite practice needed to develop vital problem-solving skills, hone understanding of basic physical principles, and operate strategies to analyze and describe physical systems. However, many teachers find it difficult to provide timely and effective feedback to students' homework sets. Moodle is an online answer entry and grading program which can provide instantaneous feedback on individual questions, evaluate students' usage of units, and provide valuable grading statistics. In my presentation, I will demonstrate how I have utilized Moodle in my AP Physics 1 classroom.

Heart Attack Physics by John Zwart

I recently had a first-hand opportunity to learn some interesting biomedical applications of physics which provide application examples for introductory classes. While there were many such applications, from X-rays to ultrasonic imaging, I'll focus on fluid flow through clogged coronary arteries and the use of radioactive materials in a nuclear stress test.

Static and Dynamic Fluid Experiments by Kristen A. Thompson

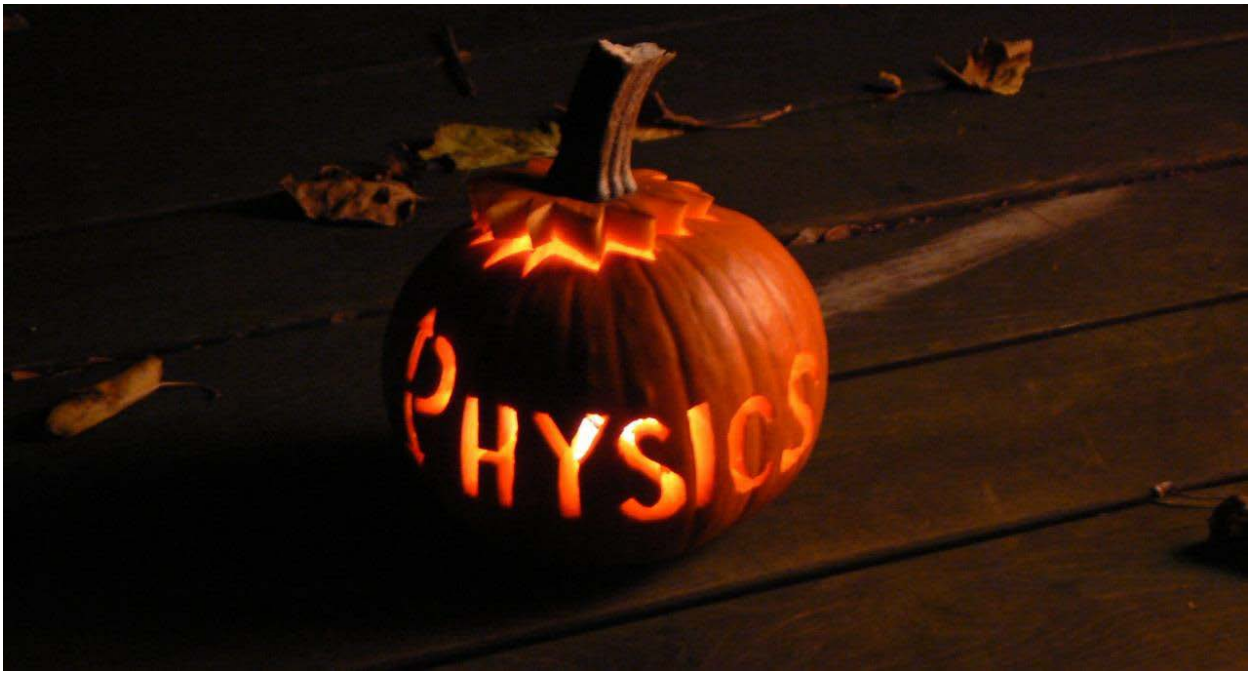
This report describes a system to have students verify the static and dynamic behavior of fluids using low cost and easy to build equipment. The equipment consists of an open manometer that can be filled with a liquid of choice (or multiple liquids) to demonstrate the relationship between pressure and fluid depth. The manometer can then be used with a small tank (5-gallon bucket) with a valve to provide a way to pressurize the system or introduce flow. Students can test Bernoulli's principle and assumptions of incompressibility in the gas phase. These experiments are appropriate for multiple levels of instruction, such as high school and undergraduate laboratories.

Demo Presentation: Demo Title = A Minor Miracle

Speaker: Fred Behroozi, UNI

Title: Spinning the Web of Halloween Physics
Authors: Dr. Susa H. Stonedahl St. Ambrose University, Davenport, IA
Abstract Text:
Halloween-themed fun can increase student engagement and thus enhance their learning and enjoyment of physics courses. From scaring students with dropping spiders (on a pulley system) to flying

bats that circle the classroom (centripetal motion lab), there are many ways to incorporate the spirit of Halloween into a physics course. In this presentation I will describe some hands-on Halloween-themed activities and physics problems that I have implemented in my own courses that provide both entertainment and educational value in a seasonal pumpkin-spiced package.



Reducing the Observed FCI Gender-gap – Matt Harding, Iowa City West High School, Iowa City Iowa

Males and females make up a relatively equal balance of undergraduate degrees in biology, chemistry and mathematics. However, females only represent one in five bachelor's degrees awarded in physics. I have administered the Force Concept Inventory as a pre and post-test with my students since 2005. The data I collected from the tests agreed with a widely observed gender-gap in performance both in terms of absolute outcomes, and potential for improved understanding. I will discuss modifications I have made to instructional strategies, as well as use of a easily-administered treatment suggested by research conducted at UC-Boulder, both of which seem to have lessened this gap in recent years.

Workshops:

Using Arduinos by Kristen A. Thompson

Arduinos are inexpensive and compact microcontrollers. These can be used for a large range of applications due to the wide range of peripherals available. This workshop will provide instruction on the basics of setting up and programing an Arduino board. In addition, student projects will be

demonstrated to show the possibilities of what can be done by students. Projects include a prosthetic hand and an automatic dog feeder.