

PHUNKY PHYSICS AT THE UNIVERSITY OF WINDSOR

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INTRODUCTION

The popular translation of a passage from the Confucian work, the Xunzi, goes, “Tell me and I forget, teach me and I may remember, involve me and I learn.” This is the philosophy behind the “Phunky Physics” outreach activities at the University of Windsor. Since 2009, we have sought to give the role of the expert physicist to our undergraduate students by putting them in charge of our outreach activities. The undergraduates are quite independent, and consult the graduate students, and occasionally to faculty members for advice and mentoring. We reach out to the secondary school student population, as well as the public to convey the excitement and joy of Physics.

DEVELOPMENT

In 2010, in celebration of the 50th year of the laser, our students developed two 30-minute programs for physics demonstrations in secondary schools on holography [1], and laser energy transfer [2]. These presentations, and the accompanying presenter manuals, were developed as part of a fourth year course called “Technical Communication Skills” for which I was the instructor. The then Head of the Department, Dr. Bill Baylis, provided a grant of about \$200 to develop about 6 demonstrations. The students presented these programs at the “Physics Education Workshop”, a day of engagement with high-school physics teachers and students, and drew much appreciation. The same year, as part of the Science Rendezvous [3] public outreach festival (that I organized in Windsor), our students created a large scale non-Newtonian fluid exhibit entitled “Can you walk on water?” This exhibit, that had people incredulously walking across a 6’x4’ pool of liquid drew crowds to the University never seen before, and gained a lot of press in the local media. Thus inspired, students have created one major demonstration exhibit annually since then – including the Ruben’s tube, fiber-optic communication, the light harp, etc., that have been featured attractions at University Open Houses, and public science festivals such as Science Rendezvous.

SUMMARY

The Phunky Physics Show is a student-run stage-show at the University of Windsor, designed to provide experiential learning and leadership opportunities for our students.

In the spring of 2012, Dr. Steven Rehse built the “fire tornado”, a dramatic demonstration of the law of conservation of angular momentum, and added it to our recruitment activities. This engaging demonstration caught the eyes of the producers of the Daily Planet [4], and is now a signature demo at our outreach events as well. At that time, I was serving as Head of the Physics Department, and I challenged the undergraduate students to come up with a stage show on Physics, similar to the Chemistry Magic Shows that were inspired by the Harry Potter™ movie series. The students, researched the experiments, applied to the Department for funding by writing proposals, built the demos, wrote the scripts, and developed the presentations. The faculty provided mentoring when requested, but the students were fairly independent in coming up with this show. The materials needed for this show was mostly taken from old laboratory equipment that was no longer used. Some costs (about \$200) was absorbed by the Physics Department. In part due to the publicity gained for the Faculty of Science by being featured in the Daily Planet, we were able to obtain \$1000 in funding from the Dean of Science to fund the development of the rest of the demos.

In the fall of 2012, the students premiered the “Phunky Physics Show”, an hour-long show using demonstrations involving physics concepts. This show was so successful that the physics undergraduates have been invited to present annually at the Rotary Club Children’s Fest. They have also been invited to present the show at local secondary schools as well as at the London Science Museum. The students have managed the transportation of the demos on their own. In the case of a demo that has a health & safety concern, that is not taken off-campus. Each show requires a minimum of four presenters. Students vie for the chance to be a presenter, and they manage a schedule of rotation. Although we did not do a formal assessment of the knowledge gained by the participants, anecdotally, the improvement in confidence of the students as they present topics not covered in class is clear.

Figure 1 shows some of the experiments that the students have developed, and the evolution of activities from an exhibit format to a show format. Interestingly, students have adopted the lab coat as a signature when they do these shows, a garb that the faculty’s generation does not associate with Physics. Most students participate



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Fig. 1 The outreach activities developed by our students have evolved from an exhibit format to a popular stage show called the “Phunky Physics Show”. Clockwise from top-left: Ruben’s tube (a visual demonstration of sound waves), magnetic levitation (demonstration of the Meissner effect in superconductors as the temperature falls below the Curie temperature), fire tornado (conservation of angular momentum), gyroscope (gyroscopic precession), plasma ball (generation of electromagnetic energy, and production of plasmas), fiber-optic communication, speed of sound (to show that sound does not travel in a vacuum), water pipe (total internal reflection) (centre).

enthusiastically in these activities for fun. Students who take on leadership roles in a particular year receive an entry in their co-curricular transcript. The current Head of Department, Dr. Steven Rehse, continues to be supportive of the Phunky Physics Show. Faculty and graduate students will often suggest demo ideas to the undergraduates, who have the final decision in what gets developed. The Phunky Physics Show is now one of the key activities of the Physics Club, which is a student organization composed of undergraduate Physics majors.

CONCLUSION

Participation in physics outreach activities has provided students a variety of experiential learning opportunities at the University of Windsor. Students demonstrate the ability to communicate with an expert viewpoint to the general public. Students have used the co-curricular transcript to demonstrate their outreach & leadership capabilities in their career development. The Physics Department also benefits from the strong sense of community built by these shared experiences.

REFERENCES

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4. “Fire tornado catches eyes of Daily Planet producers”, University of Windsor Daily News, May 10, 2012. <http://www.uwindsor.ca/dailynews/2012-05-09/fire-tornado-catches-eyes-of-daily-planet-producers>.