Activating students in laboratories. Trusty and reliable solutions.

Radojewska, E. B.

Institute of Physics, Wroclaw University of Technology

Wroclaw, Poland

beata.radojewska@pwr.edu.pl

Abstract

The article describes successful methods used in my laboratories to activate, animate and inspire students for more efforts, interests and engagements in the laboratories. A few cases are described. The first one consists in making a reading materials for labs more attractive. The next uses a unique competition method which activated most students in the lab. The next one involves one of the students to show his hobby and to arise an essential discussion with a scientific background. Last year university event resembled that students preferred practical exercises so by a choice of the problem range we could activate students as well. Having few students in the lab to teach at a moment there are much more possibilities to make them more active than in a lecture. But some solutions, described in the article, can successfully be extended to large-enrollment classes.

Keywords: Activating students; Teaching with astonishing extras; Continual challenges for students.

Summary

An activation of students for greater efforts and engagements in learning should be a goal of each teacher. It helps not only talented students to develop their skills above average but also mean ones to achieve higher level than they would attain other way. The students response to an activation process is positive, so let us take advantage of it.

Introduction

Computer laboratories are carried out in small groups, usually with 16 students (at our university). Laboratories do not belong to large enrollments unless the number of groups is ten or more for a given course. But still 16 students at a time. Having only 16 people to teach at a moment there are much more possibilities to make them

more active than in a lecture. But some solutions, described below, can successfully be extended to large-enrollment classes.

Surprising extras added to a mandatory reading material (or a problem list to do).

I prepare complete reading materials for my classes with many detailed threads and examples. This may seem a little boring to students (when compared with a good crime story). Much to read every week. The material is published (www) 5 days before labs. I usually insert funny pictures (as in Fig.1) between explanations, or between conclusions. The aim of such a "decoration" is to wake up a presence of mind, a small relieve in a thought concentration. Sometimes I place a link to YouTube video (as one in Fig.2) which plays the same role, and also illustrates a problem in an amusing way.

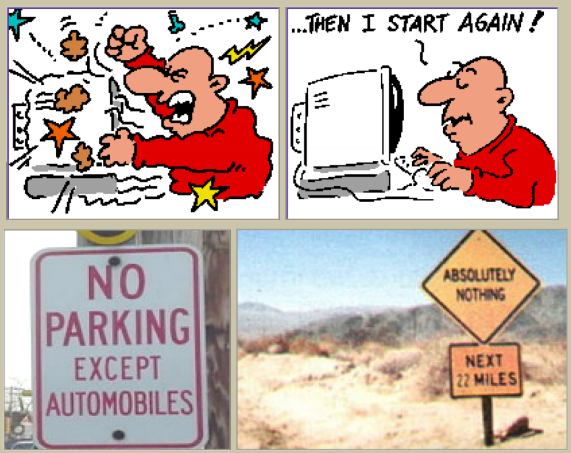

Fig. 1. Examples of amusing pictures inserted into a reading material in order to wake up a presence of mind.

Fig. 2. Example of an amusing youtube video which is to illustrate a physical problem. https://www.youtube.com/watch?v=2OTOgTZRmNw

Opinions of students (of the Numerical Methods in Physics): They anxiously waited for the material publication day to open and see images for the coming week. Therefore they had five days to learn, otherwise they would open and read a day before the lab at best.

Virtual awards for the first best solutions or student's tasks well done.

Tasks themselves to be done on my labs are revealed at the beginning of the lab. Students can earn their score with equal chances. Some tasks, particularly in the second half of the course, are complex and students are divided into two-person teams. I announce a competition between teams: who is better, who is faster? It usually in the past did not rise much emotions unless I once added that the winning team would get zozole candies (I had some with me by chance, popular fruit candies). The score result was not so important as candies for the winning team. Students behaved like kindergarteners, they wanted the candies more than anything else. They accelerated their work on the task, no waste of time for facebook visits. I realized that this could be a very efficient method for activating students to do their best on the lab. So selected tasks now have an inscription at the end of the task description, as shown in Fig.3. I buy zozole candies every semester.

Fig. 3. The inscription in the laboratory task (in Polish: zozole candies wait for the best team!)

Opinions of students (of the Web Technology Lab): They called the candies as a "taste of the triumph" and they felt almost as in Olympic games. The award was unparalleled and infrequent to them, so they partook in this competition with all their heart.

A deliberate usage of students hobbies (recorded to a video if possible for lab-room use)to arise an essential discussion.

I frequently ask students what they are interested in, what is their hobby. If I find an

uncommon one, I invite this student and the rest of the group for video recording to document special skills and to look for problems and issues which can be modelled in a computer program or at least discussed on a scientific background. I found that when students had to discuss anything connected with his or her colleague they became more open and less shy as if they wanted to make a pleasure to the colleague. The example of such a video is available at http://radojewska.net/ptee2014/bike/

The frame shots are shown in Fig. 4. The video was entitled “Physics by bicycle, there and back” (meaning a bit mysteriously that physics is able to cycle and even in both directions).

The student on the bike was a member of the “Nabla” Student Scientific Circle and he was proud that he could promote his Circle at the student community forum and he could show his uncommon skills.

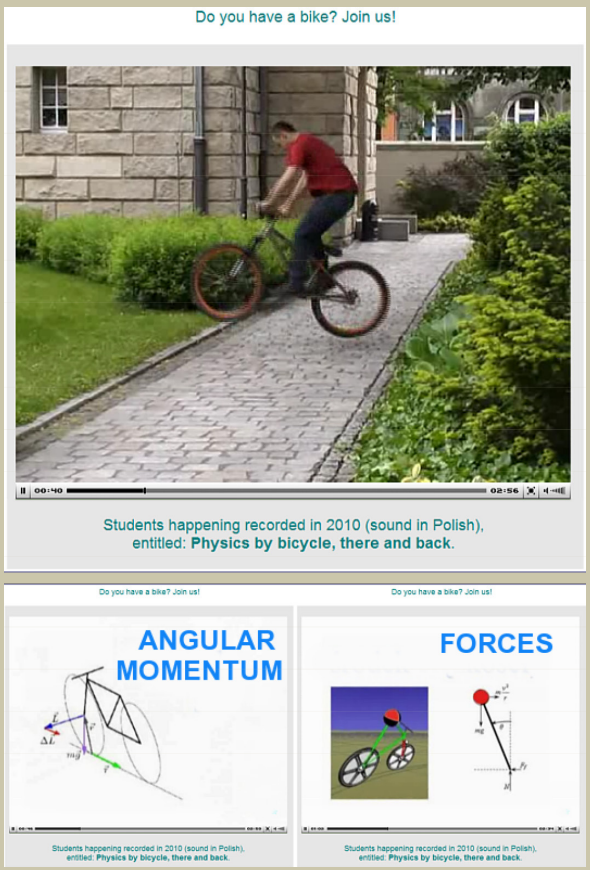

Fig. 4. Frame shots from the video: Physics by bicycle, there and back.

Opinions of students (of the Computer Modelling Lab): They had a little trouble with

a question on how many parts were rotating in a bike. They liked the happening very much. They admired their skillful colleague. A few joined Student Scientific Circle.

Search for surrounding circumstances which may be included to activation schemes.

In 2013 our University launched a gondola (named Polinka, Fig.5) to join university buildings on two riversides (the bridge is quite far). This event was famous in media. Everyone wanted to travel in Polinka as a university attraction.

Fig. 5. Polinka – the university gondola linking two riversides (built in 2013).

I used this fact to resemble that five years earlier, when students were frequently late for my lecture due to a crowd in a tram near the student hostels at 9:00 (five large hostels at one place far from the university). I joked then that students should design a gondola to commute. Afterwards one student came and said: I shall design. And he did it in 2008 as his engineer's diploma. He focussed on the gondola fastener to the rope, made calculations, drawings and a model. Then he animated the gondola travel from students hostels to our university campus, frame shots are shown in Fig. 6.

The animation is available at http://radojewska.net/ptee2014/gondola/

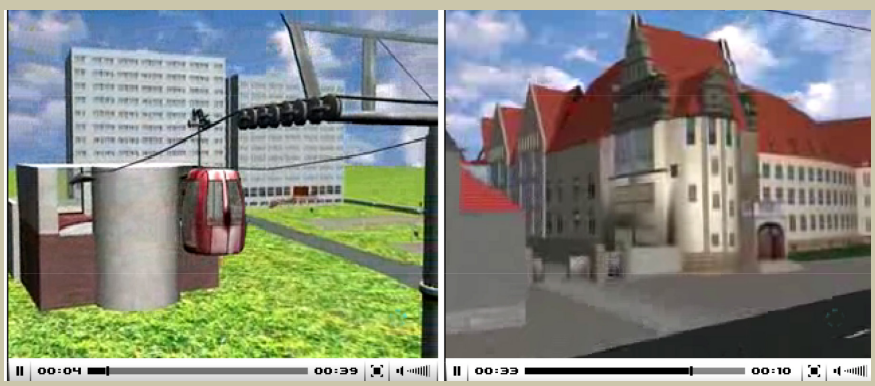

Fig. 6. Frame shots from the gondola animation. A part of the diploma by M.Rak.

Student hostels in the left and campus buildings in the right.

No-one expected that our university would have a real gondola within five years. Polinka gondola does not, however, travel to the students hostels, only to the other riverside (two minutes of the ride).

But our students could overtake time! This gave a basis for a discussion on: Is students laboratory work needful or useless (beside teaching)?

Students preferably would rather do more practical exercises. So a range of the taught matter may activate students as well.

Final remarks

An activation of students for greater efforts and engagements in learning should be a goal of each teacher. It helps not only talented students to develop their skills above average but also mean ones to achieve higher level than they would attain other way. The students response to an activation process is positive, so let us take advantage of it.