Developing Demo/Teaching Kits Based on Departmental Research Strength

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Common Objectives of Research Project Courses

1. Integrating Theoretical and Practical Skills
2. Extensive Reading & Searching
3. Teamwork Spirit & Management Skills
4. Documentation & Presentation Skills
Innovation Features of Our Scheme

1. Incorporating Faculty’s cutting-edge scientific discoveries / inventions

2. Target outcomes: Demo/Teaching Kits

- Students’ motivation is stimulated and strengthened
- Used for enriching undergraduate physics courses and promoting science to general public.

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Project Action (I)

Information sessions on Departmental Research strength and Achievement

Participated students are enrolled in PHYS191/291/391 or PHYS398 project courses

Project outcome:
Demo/teaching kits (either hardware or software)
Project Action (II)

Use of research outcome:

- Teaching kits for upgrading existing experimental physics courses;
- Demo units for in/out school visits, science talk series and other outreach activities (for promoting science education and students’ research culture);
- Student presentations as a component of PHYS1/2/380
Project Objectives

★ Develop a learning culture through hands-on scientific research

★ Promote *student-led research* (encouraging students’ independent learning and critical evaluation of their own methodologies)

★ To broaden students’ knowledge base of Science

★ To develop a variety of students’ skills: experimental construction, multimedia production, independent and critical thinking, problem-solving and presentations

★ To develop the potential and sustainability of the existing project courses

★ To promote popular science to the public inside and outside HK
Peer Support

★ Physics Teaching Lab (staff, space & equipment)

★ CELT: attending oral presentations, designing evaluation sheets, conducting group and individual interviews

★ Faculty supervisors visited 2ndary schools with the student presenters

★ School of Science: 1) arranged visits from overseas students 2) selected one topic as a show case in Inno Expo 2007
“Visible” Outcome

★ Since 2005, 6 software and 5 hardware demo/teaching kits have been developed
★ Research outcomes are good: all the selected 15 students obtained B+ or above for their projects

Air pollution monitor

Admission Control Method of Multi-service Mobile Network

Carbon Nanotube
Air Pollution Monitor
“Visible” Outcome

A teaching kit, *sonic band gap experiment*, is being used in PHY311 (Advanced Experimental Physics)
Evaluation

» Experience sharing meeting during the project period among the participating students.

» Comments from audience of the end-semester presentations

» Comments from the users of the prototypes

» Evaluation from secondary schools
Figure 1: Statistics of the presentation assessment checklists (sample size = 55) on five aspects of the project presentations.
Figure 2: Statistics of the presentation assessment checklists (sample size = 55) on six sub-aspects of the content of the project presentations.
Figure 3: Statistics of the evaluation (sample size = 143 from 23 schools) on six aspects of the demonstrations during outreach activities.
Conclusion

Our approach has better realized the potential and sustainability of existing physics research project courses.

It provides a platform for students to strengthen their various aspects in the learning culture.

The “visible” outcome (demo & teaching kits), will certainly have long-lasting impact on improving the quality of teaching and learning within the department and on promoting science education in our community.

The methodologies and experience gained in this approach are easily adaptive to other fields of University education.