

# 2<sup>nd</sup> International CDIO™ Conference

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Relevance to the following themes

- Teaching, Learning and Assessment
- The Development of Student Skills

## Helping! (Yourself through others)

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"Asking why I incorporate community service into my teaching is a little like asking why I incorporate breathing into living."

*-Bob Hansman, Associate Professor, WU*

While mostly applicable to the American context, the ABET criteria for engineering competence is widely accepted. South Africa also has its own exit level outcomes as stipulated by the Engineering Council of South Africa (ECSA outcomes) and CDIO has standards driving quality in engineering education. All three these guidelines include personal, interpersonal and system elements as well as professionalism as expected outcome.

Multidisciplinary working and effective communication also features very prominently. Purely technically focussed projects run the risk of detracting the focus of students towards the science of the activity at the cost of self reflection and intra personal growth.

This paper reports on the Community-Based Project aimed at empowering students from the Faculty of Engineering, Built-Environment and Information Technology at the University of Pretoria. Since this project has been designed prior to the University's involvement with CDIO, the paper further informs on possible alignment of this existing programme with CDIO guidelines in order to build on similarities and augment if and where applicable.

## The Community-Based Project

Community-based learning is a relative new field of learning at the University of Pretoria. It is a form of experiential learning with the focus on accomplishment of tasks, which meets genuine human needs, as well as the execution of the tasks that serve as an educational and learning tool aimed at the acquisition of a number of important life skills by the students. The Faculty of Engineering, the Built

Environment and IT at the University of Pretoria implemented, as from 2005 a new compulsory module, *Community-Based Project*, for all undergraduates.

## Objective

The execution of the project is the visible side to the module and as such it can be seen as the *product objective* of this module. However, the primary drivers behind this module are outcomes which may be less tangible or observable. These *process objectives* are reached through the student's experience while executing a community service related project. *Process objectives* aim to develop an awareness of personal, social and cultural values as well as multidisciplinary and life skills, such as communication, interpersonal and leadership skills. Results indicate that the module is also successful in promoting growth in the area of the ABET aim of preparing students to understand the impact of solutions in a global and societal context.

## Execution

The eight-credit module is offered on an open-ended and project-orientated basis. The students attend a compulsory orientation sessions and then submit their projects in the form of a proposal for evaluation and approval. Only after proposals have been accepted, do students start with their fieldwork. After the students have done their fieldwork they report on their experiences and lessons learnt via a presentation and webpage report. The uptake of the module can be seen in figure 1 where enrolment figures are stated. While assessment in such an open context is always problematic, a standard representative of the image of the Faculty is jealously guarded. 16.5% of the first year's students failed the module.

<b>Number of students for Community-Based Project Module</b>		
	<b>Completed 2005</b>	<b>Enrolled 2006</b>
JCP 201 (School for Built Environment)	105	153
JCP 202 (School for IT)	14	162
JCP 203 (School for Engineering)	121	273
<b>TOTAL</b>	240	588*

\* The module is compulsory for all undergraduates registered as from 2005.

**Figure 1:** Student Enrolment Statistics

## Currently running projects

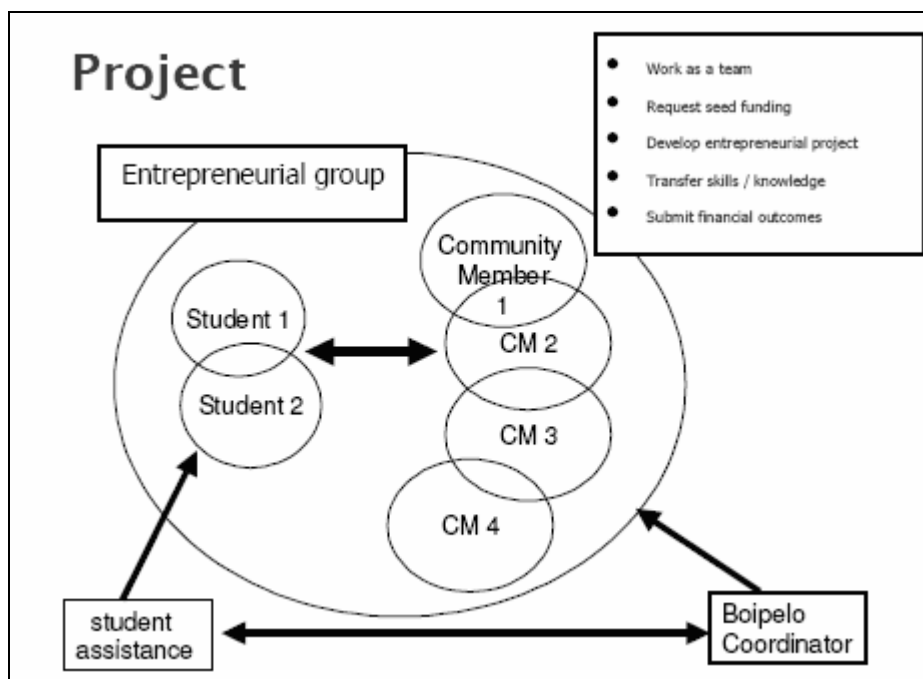
While the list below is not exhaustive it gives an indication of the kind of projects with which students are currently busy.

- Assistance with maths and science for Senior school students during July holidays
- Projects at a Discovery Centre

- Gauteng-on-Line (electronic learning assistance)
- Assistance with computer skills at schools
- Assistance with Maths and Science at schools
- Assistance with computer literacy at schools
- Mentorship Programmes at schools
- Assistance with the Engineering week (Faculty showcase and general introduction to engineering aimed at recruiting new students)
- Development of Entrepreneurial skills for the community

## Project Example

The entrepreneurial development project is at Tshegofatsong School which is in a financially struggling area. A visual overview of this project and the way in which participants interact is shown in figure 2. This project is currently running and initial reports suggest good results.



**Figure 2:** The Boipelo project's organisational structure and aims.

## Initial problems

- Time management of some of the students.
- Reachable and clear set outcomes for the communities and the project.
- Communication between the communities and the students.
- Students who only came on board after the completion of the compulsory contact sessions.
- Students were very confused about the assessment even though it was distributed as a hard copy, placed on the WebCT and E-mailed to them.
- Students did not access WebCT or their E-mail on a regular basis, making communication with students very difficult.
- Even though students could attend a course on the designing of WebPages, many students were still unable to design a webpage or upload it on WebCT. Many online assignments were also submitted as blank forms.
- Some students indicated themselves as computer illiterate.
- Students either did not submit their assignments online or submitted empty documents.

- Students could not upload their websites or submitted un-encoded websites.
- The marks were placed on WebCT for two weeks before it was submitted to Administration, but students did not respond to the question marks.

## Successes

- Students were very positive about the module.
- Most of these students worked more than the expected 40 hours.
- More than half of the students already indicated that they want to be mentors for the students in following modules.
- Very good working agreement/assessment existed between the departments.
- Very creative work were submitted by some of the students.
- Positive feedback on the students' interaction with the communities was received on the reflection assignments.

## Feedback from students

A short selection of comments from students:

- "It gives me some way of giving back"
- "The willingness of students to be involved with me! So much faith and trust that we can really help them in Science and make a difference in their lives really requires determination and responsibility [from me]"
- "Giving a service and making lives better was a fundamental learning point"
- "I learned a lot through this years project. My people skills have improved and I have learned that you can enjoy your work!"

## The UP Community-Based Project and CDIO

Students are often satisfied with a mere passing grade. The community based project provides the external exposure and pressures of real life experience where *almost* is not good enough. While the project was designed without a specific CDIO focus, the similarities are clear. The CDIO vision is to educate students who understand how to Conceive-Design-Implement – Operate complex systems in modern team based engineering environment. This UP community based initiative gives students exposure to learning opportunities addressing many of the aims as voiced in CDIO standards 3 and 7. Per se we believe that this module already succeeds as a module in full CDIO spirit.

We acknowledge that in terms of more traditional CDIO projects this contextualised contact currently comes at the cost of moving hard core engineering skills, at least for this module, to a peripheral status. Arguments can be made to the effect that exactly this shift helps to focus students on the CDIO skills side of the experience. A further view raised is that the fact that this module enjoys compulsory status, it underlines the significance which CDIO skills hold for the faculty.

The said sacrifice obviously need not be made. Initiatives to enlarge the community involvement component in another module focussed on innovation, set the platform for an integrated project where a student team can identify and innovatively solve a real life community problem.