

Teaching In Faculties: Making science relevant for professional degree programs

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The Faculty of Science teaches in many professional degree programs especially in first year. These units of study are mostly mainstream, and hence not customized for the clients. The short term aims of this project are to:

- improve the first year experience for students in client faculties;
- develop targeted units of study for professional degree programs;
- define models of ‘approaches to delivery’ that are transferable to other disciplines; and
- raise staff awareness of the needs of incoming students.

The long term aims of this project are to ensure:

- sustainable ongoing delivery of quality focused learning experiences to students in professional degree programs; and
- effective liaison with client faculties for ongoing developments.

This project targets the student learning experiences in four professional degree programs.

Biological Sciences delivering to Education students. The objectives are to:

- customize an existing unit of study to make it more appropriate and relevant for BEd Human Movement and Health Education students; and
- design the model so as to enable its transfer to other client faculties (e.g. Biology for Agriculture, Biology for Nursing, Physics for Education).

Chemistry delivering to Agriculture students. The objectives are to:

- convert a suite of *ChemCAL* modules to an online format so that they can be accessed and used by students any time, any place;
- tailor the *ChemCAL* modules to better suit the targeted units of study and the School of Chemistry’s teaching philosophy; and
- make the modules available to more students and the content more relevant to the students’ learning.

Mathematics and Statistics delivering to Engineering students. The objectives are to:

- develop web-based packages of components of first year mathematics material that can be used within Engineering to better meet the needs of all Engineering students; and
- develop a pilot compiler that will package the modules with a layered interface to allow for flexible use by students and delivery via *WebCT*.

Physics delivering to Agriculture students. The objectives are to:

- move to more appropriate and more flexible delivery of the physics material within an agriculture unit of study;
- identify topics within *Climatology* and *Agricultural Environment and Equipment* that would be better delivered via the Web than via lectures; and
- develop web-based materials to cover these topics.

The project is based on an action research model with in-depth evaluation of the teaching reforms and associated learning outcomes as a priority. The evaluation strategy for the project uses Kirkpatrick’s four-level model as a guide. Our interpretation of the model is:

Level 1 – reaction – measure of student satisfaction

Student surveys were administered at the end of semester 2, 2001 in three of the four sub-projects. Information obtained through this level of evaluation will be used to:



- guide modification of and enhancement to the teaching materials;
- guide changes aimed at improving the student learning experiences within the targeted first year units of study; and
- assist in evaluation of the underlying models for teaching reform.

Level 2 – learning – measure of skills and knowledge learned

This evaluation is being conducted within the sub-projects by the academic staff involved with the students. Qualitative comparisons are being done between the 2000 student cohort who were not exposed to the teaching innovation and the 2001 student cohort after the introduction of the teaching innovation. Information obtained through this level of evaluation will be used by teaching staff to:

- consider possible modifications to their teaching practices; and
- review the alignment between the unit of study objectives and the teaching materials and learning experiences being offered.

Level 3 – transfer – measure of transfer of the knowledge, skills and understanding gained in the first year unit of study to an appropriate second year unit of study

The results of a survey that looks at the student's awareness of a strong relationship between the first year unit of study and the professional program will be correlated with the student's overall performance for the second year unit of study. Information obtained through this level of evaluation is:

- testing the alignment between the contextualised first year general science units of study and the second year professional degree units. If successful, the students will benefit by having a better understanding of the relevance of the discipline area within their professional degree program.

Level 4 – dissemination and value to the organization – measure of cost effectiveness and organizational benefits

Evaluation for this level is in the form of focus questions. Information obtained through this level of evaluation will be used to:

- demonstrate to the University that cross-discipline projects, such as this one, can, not only be successful, but also deliver long term benefits.

There are three emerging models for approaches to curriculum and delivery reform that may be transferred to other disciplines.

Model 1 (being implemented by the School of Biological Sciences) – This model took the approach of 'value adding' to an existing unit of study. This involved some modification to the content and some focus on the professional pathway of the student cohort.

Model 2 (being implemented by the Schools of Chemistry and Physics) – This model consists of modules within a unit of study (with the potential to be modules across units of study for just-in-time learning, revision, or core topics).

Model 3 (being implemented by the School of Mathematics and Statistics) – This model consists of packages of material which are to be used both within a unit of study (first year Engineering students) and across units of study (just-in-time revision for third year Engineering students).

References

- Kirkpatrick, D. (1994) *Evaluating Training Programs: The four levels*. San Francisco: Berrett-Koehler.
- Kirkpatrick, D. (1996) Techniques for evaluating programs, part of Great Ideas Revisited series in *Training & Development*, January, 54-59.
- Kirkpatrick, D. (1996) Revisiting Kirkpatrick's four-level model, part of Great Ideas Revisited series in *Training & Development*, January, 54-59.
- Prosser, M. and Trigwell, K. (1999) *Understanding Learning and Teaching: The experience in higher education*. Buckingham: SRHE and Open University Press.

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