

PROJECT BRIEF

LEARNING OUTCOMES AND CURRICULUM DEVELOPMENT IN PHYSICS

1. Introduction

Each year the Australian Universities Teaching Committee (AUTC) funds projects aimed at significantly improving teaching and learning. The AUTC is a national body aimed at improving Australian university teaching and learning. The Committee's Terms of Reference are to:

- ◆ identify emerging issues in teaching and learning in Australian universities and propose strategies for dealing with these issues;
- ◆ identify and support effective methods of enhancing learning;
- ◆ encourage dissemination and adoption of these methods across the Australian university sector;
- ◆ promote collaboration and exchange of information in teaching and learning both nationally and internationally, and encourage and foster innovation in higher education teaching and learning; and
- ◆ manage the selection process for the Australian Awards for University Teaching.

Projects commissioned by the AUTC in 2003 will be managed by a national steering committee that will meet regularly from the start of the study. The steering committee will consist of members of AUTC and domain experts with national and international standing in the area being investigated by the project.

The Committee is particularly interested in learning more about the varying ways in which issues of teaching and learning in Physics have been approached at the disciplinary level, in the context of such factors as:

- (a) the response to the new requirements of multidisciplinary areas
- (b) the increasing role of the new technologies and of globalisation;
- (c) the changing nature of the student body and of student expectations;
- (d) variations over time in graduate employment destinations and the requirements of employers;
- (e) the relationships between Physics and Engineering, and Physics and Biological Sciences; and
- (f) the need for academic physicists to give a lead on the preparation of teachers for physics in schools.

These studies must produce an evaluative overview of courses in each of the areas with a focus on the specification and assessment of learning outcomes and must identify strategic directions for universities to enhance teaching and learning in these areas.

In seeking to identify examples of best practice in teaching and learning in Australian universities at the level of discipline or field of study, the AUTC is recognising the importance of the differing natures of the disciplines, and the ways in which effective innovation is frequently a response to the particular circumstances and pedagogical requirements that apply at the disciplinary level.

2. Background

The increasing diversity of student needs and the changing demands of the workplace have resulted in the need for more flexibility in delivery and in planning curricula so that graduates have a broad range of experience. It is clear that Physics as a discipline needs to work actively

to build links to other professions and disciplines and for collaborative learning strategies in multidiscipline areas, to keep track of broader contexts. Presently, it appears that students have to identify multidisciplinary opportunities for themselves.

During the last decade there has also been a rapid pace of scientific and technological development in Physics, which is still accelerating. Significant progress has been made in research on teaching and learning processes and on using new technologies for teaching and learning. The expectations for Physics programs have changed and evidence is mounting that they need revitalisation. There needs to be a focus on developing and disseminating effective instructional interventions based on rigorous research in student understanding. Physics should take advantage of effective new, research based, teaching methods such as interactive lectures, integrated laboratory experiences, structured problem solving, conceptual tutorials, and technology enhancements to make the classroom more interactive, aid visualizations through simulations, and provide real-time physical feedback.

The Australian Universities Teaching Committee is calling for expressions of interest from institutions to carry out a major project in this important discipline area.

It is envisaged that the project would be completed in two main stages, each of one year's duration. Initially, funding will be guaranteed for the first stage of the project only. Funding for the second stage will be provisional and will depend on successful completion of the first stage and approval of a more detailed proposal for the second stage.

3. Project Description

(a) Tasks

Stage 1

Stage 1 of the project comprises a review whose purpose is to identify the extent to which innovations in teaching and learning and processes of curriculum development and review have been deployed in response to the requirements of new multidisciplinary areas, as well as the needs of students and employers.

The project will describe and evaluate:

- the impact of new multidisciplinary areas on teaching and learning;
- national and international developments in teaching and learning in the discipline area;
- ways in which universities have assessed and responded to the changing nature of the industry and the changing nature of graduate employment in the industry;
- ways in which the processes of curriculum development and review have been varied and enhanced to take account of changing circumstances;
- how information can be disseminated within physics classes to acquaint students with the possibilities of multidisciplinary opportunities and to look at how such opportunities might be managed in practice;
- the role of professional experience and its management within the curriculum; and
- graduate employability and the employer/industry satisfaction.

In addition the project will describe, evaluate and suggest changes for improvement related to:

- methods of assessing student and employer satisfaction, and the role such assessments play in curriculum review and enhancement of teaching and learning;
- relationships between course design and indicators such as enrolment and employment trends, graduate satisfaction and graduate employability;
- ways of incorporating strategies for the use of industry expertise in curriculum development and in the teaching and learning process; and
- strategies for the development of academic staff and for resolving academic staff shortages.

The project will produce a report on the above matters, and

- highlight examples of best practice in teaching and learning in the field of physics;
- make recommendations for the effective dissemination and take-up, as appropriate of these examples of best practice;
- place these examples of best practice in the context of an overall assessment of the quality of teaching and learning across the discipline; and
- outline a detailed proposal for completing stage 2 of the project.

Stage 2

Stage 2 of the project should result in practical outcomes for students and university staff, as well as having an impact across the sector.

This stage of the project may include, but is not limited to:

- development of resource materials for use by staff and students;
- implementation and evaluation of innovative solutions to problems identified;
- preparation of case studies of innovative practice;
- conduct of forums and workshops across the sector to raise awareness and enhance staff expertise; and
- analysis of the relationship between course design and indicators such as enrolment and employment trends, graduate satisfaction and graduate employability.

(b) Duration

The project is to begin on signing of the contract and Stage One is to be completed within twelve months. The entire project is to be completed within two years. The proposed timetable for the project must be included in the submission but the actual timetable is subject to negotiation and agreement.

(c) Funding

This project will be funded through the *Higher Education Innovation Programme* (HEIP) which has its legislative base in the *Higher Education Funding Act 1988* (HEFA). Only institutions receiving an operating grant through HEFA, or incorporated bodies, are eligible to apply for an AUTC project grant. With the exception of incorporated bodies, grants provided through all components of HEIP are treated as increases to grants provided for operating purposes or limited operating purposes. At the time a grant is made through HEIP, the recipient will be informed of all conditions relating to the provision of the grant. Applicants should consult relevant sections of the DEST website¹ for further information about HEIP requirements.

A fully justified budget is required from each proposal. The budget should include the costs of approximately three meetings of the national steering committee. Costs for AUTC members of the committee will be met by the AUTC but all other costs must be met from the project budget.

Stage 1 funding will be no more than \$75,000. Total funding for both stages of the project will be approximately \$150,000. Funding for Stage 2 will depend upon satisfactory completion of Stage 1 and the acceptance by the AUTC of a proposal for Stage 2.

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4. Selection criteria

Proposals will be assessed in terms of:

- demonstrated understanding of the issues involved in teaching and learning in the field of physics;
- capacities of the methodologies proposed to deliver appropriate outcomes;
- experience and demonstrated capabilities of the project team in relation to the tasks outlined; and
- value for money.

5. Expressions of interest

Expressions of interest in the first instance are to be **no more than 5 pages in length**. They should include an outline of the proposed approach and methodology, a notional budget and a section addressing the selection criteria.

More detailed proposals will be invited from those submissions which are short-listed by the AUTC.

The closing date for expressions of interest is the close of business on **Friday 7th March, 2003**. Please note that extensions of time will not be granted.

Expressions of interest should be marked **AUTC Projects Expression of Interest** and posted or couriered to:

AUTC Secretariat
Location 138
Higher Education Group
14 Mort Street
GPO Box 9880
Canberra ACT 2601

Further information can be obtained by contacting Professor Alan Robson of the AUTC on 08 9380 2808 or alan.robson@uwa.edu.au or Lana Murray at the Department of Education, Science and Training on telephone (02) 6240 8918 or email autc@dest.gov.au.

WE SHOULD ADD SOMETHING ABOUT EXPRESSIONS OF INTEREST AND ELECTRONIC COPIES OF SUCH EXPRESSIONS

REPORTS SHOULD HAVE AN EXECUTIVE SUMMARY TO GO ON WEBSITE