Novel Assessment Strategies for Final Year Projects
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Summary
It is undeniable that final year projects are an important component of any honours degree. They provide students with an opportunity to learn and develop practical and/or analytical skills. In general, there is no requirement for projects to be based in University of Glasgow laboratories and additional skills and experience gained by placing students with a commercial partner can significantly enhance their prospect for employment or entrepreneurship. However, suitable assessment of commercial projects can be a challenge due to potential differences in the expectations for project outcomes between commercial and academic supervisors. Furthermore, library based or knowledge transfer projects may also develop important skills but provide other significant challenges for assessment.

The aim of this project is, therefore, to develop and evaluate novel assessment strategies to allow the diverse nature of final year projects to be assessed in an equitable manner. Novel strategies are being developed across the Faculty of Biomedical and Life Sciences and have evolved from Objective Structured Clinical Examination (OSCE) techniques more routinely employed in the Faculties of Medicine and Veterinary Medicine. Their evaluation will comprise a comparison of project performance in assessments of library projects, traditional lab based projects, commercial projects or knowledge transfer projects using standard assessment procedures (e.g. submitting two reports; one commercial and one academic as used in Infection and Immunity) and novel assessment strategies. The comparison will focus on relative performance in the project and degree examinations, the impact of the novel assessment strategies on employability and University engagement with commercial partners.

As a result the project will address the University’s strategic objectives in learning and teaching by

- developing assessment methods to promote student learning and flexibility
- enhancing the student experience by embedding skills and learning opportunities
- encouraging entrepreneurship
- enhancing employability and enterprise

Aims and Outcomes
This project sets out to achieve the following aims and outcomes:

- to continue to develop and evaluate novel methods to allow equitable assessment of final year projects with diverse natures and enhance standards for quality assurance
- to provide a robust mechanism for validating alternatives to traditional honours projects that provide flexibility and additional learning opportunities to enhance the student experience
- to provide additional routes for the University to engage with commercial partners by making them ‘stakeholders’ in the educational process and consequently encouraging entrepreneurship, enhancing academic enterprise and student employability
This project has the potential to benefit all final year students across the Faculty of Biomedical and Life Sciences and in many other Faculties that employ final year projects. It is envisaged that the assessment methodology will provide a model that can be applied across the breadth of academic disciplines with the University and does not necessitate data collection for the practical application of academic knowledge. Applying such a model across the University will allow potential benefits to be sustained well beyond the initial duration of the project by providing increased scope for alternatives to traditional honours projects and flexibility that will enable educational standards to be enhanced despite increasing pressure on staff-student ratios.

Previous Work

This project provides a single mechanism to address a range of problems that might be familiar to many staff teaching within the University of Glasgow. The continuing pressure on the staff-student ratio means that individual staff are required to offer ever greater numbers of final year projects. Various strategies have commonly evolved to deal with this issue including the use of group projects, continuing projects over sequential academic years (perhaps with the view to increasing statistical power and the potential for publishing project data) or offering library based projects. These strategies can lead to significant problems in relation to student assessment through difficulties in establishing the precise contribution made by individual students in group projects or continuing work on an established project. There is also a perception by undergraduate students that library based projects may be less valued in the assessment process and therefore less attractive (almost being undertaken as a last resort).

More recently, staff have been offering projects in association with commercial organisations where the students develop skills in learning opportunities that do not necessarily generate data that facilitates presentation in a standard academic thesis. Where projects involve knowledge transfer (e.g. in collaboration with the Glasgow Science Centre, local authority organisations or the NHS) it is virtually impossible to provide a report that addresses both the required academic standards of the discipline and the practical issues that engender the project. This disparity can be addressed by submission of two reports that address each aspect of the project independently. However, this approach can also create a problem where the expectations of commercial and academic partners are met to different extents.

The problem in finding suitable assessment methods in a situation where academic, commercial and legislative requirements are conflicting is an area where the project leader for this proposal has significant experience. This experience was obtained in developing undergraduate and postgraduate education packages relating to scientific procedures involving animals for industrial, funding council, research council and charitable partners. These educational packages required assessment strategies to be developed (to address our partner's obligation to monitor effectiveness from their funding provision) so that students could demonstrate practical and analytical skills without compromising the UK Animals (Scientific Procedures) Act 1986. This was achieved by adapting the well established model of Objective Structured Clinical Examination (OSCE) techniques routinely employed in the Faculties of Medicine and Veterinary Medicine. The model allows academic understanding to be established using the application of knowledge or technology. For the educational packages developed previously, this would be through the application of appropriate experimental protocols and subsequent analysis of the data generated. Obviously, the assessment of academic understanding does not necessitate the generation of experimental data and consequently the model can be developed to show such
understanding through knowledge transfer that reflects the necessary standards for the academic discipline.

Methodology

The main activities supporting this project are

a) continued development of assessment methods to promote student learning
b) enhancement of our student’s experience by enabling new learning opportunities through diversity in final year projects
c) greater engagement with commercial partners to facilitate academic enterprise and promote student employability
d) augmentation of quality assurance by establishing objective assessment criteria that can be applied in diverse learning environments

This project will achieve the previously stated aims and outcomes through the activities listed above. The activities are inter-related and consequently will produce outcomes that support more than one of the project aims. Details of how we envisage the activities will achieve the aims and deliver the outcomes are given below:

The continued development of assessment strategies will provide a focus for ensuring that appropriate skills (e.g. academic, commercial or practical) are embedded across the range of final year project experiences that are and could become available to our students. Further development on the model that evolved from OSCE techniques will allow equitable assessment of individual students over the range of project formats that are available now or that will become available in the future. Specifically it will mean that skills and learning achieved by an individual student can be more objectively assessed and apparent when involved in group work or a project continuing over sequential years. The model will further evolve to provide equitable assessment of practical, analytical and knowledge transfer skills so that alternative final year project experiences can be offered while maintaining high confidence in our quality assurance. These new learning opportunities will enhance our student’s experience and facilitate engagement with commercial partners by addressing their commercial needs without losing academic rigour. Furthermore, assessment techniques can develop in association with commercial partners and directly address areas that would enhance student employability (by directly demonstrating skills that potential employers will value) without undermining core academic standards.

A simple example of an assessment used previously is shown below to illustrate this model:

<table>
<thead>
<tr>
<th>Candidate Number:</th>
<th>Assessment Date:</th>
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<tbody>
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</table>

The candidate is provided with abridged versions of two scientific papers that describe the apparently contradictory effect of the same drug on in vitro blood vessel contractility and systemic arterial blood pressure in vivo.

Score

1. Verbalise a critical appraisal of the literature provided
   - describe the aims of the study
   - assess the suitability of the techniques being employed
- comment on the validity of the hypothesis being tested
- draw appropriate conclusions/highlight omissions

2. Design an experimental protocol that could provide a pharmacological explanation for the different \textit{in vitro} and \textit{in vivo} responses observed to the drug.

3. Assemble the equipment and resources necessary to conduct the experiment designed. Verbalise checks on the equipments function and calibration as required.

4. Generate reliable data, analyse and present data in a suitable way to explain the pharmacological basis for the different \textit{in vitro} and \textit{in vivo} responses observed.

\hspace{1cm} n.b. while this example is focussed on practical skills in basic biomedical sciences the model is simple to adapt and address issues of knowledge transfer or other academic disciplines.

\textbf{Potential Applicability / Transferability}

The use of well refined objective assessment methods for final year projects will provide a significant benefit by assuring quality in our assessment of student standards while allowing a substantial increase in the scope and nature of projects offered. In terms understood by the Science and Medical faculties, this would remove some of the pressure on academic staff to offer traditional ‘laboratory based’ projects. In other faculties, the ability to offer projects reflecting a substantial component of knowledge transfer or supporting undergraduate academic endeavour/entrepreneurship may provide similar benefit.

The proposed project is inclusive and will involve staff from across the Faculty of Biomedical and Life Sciences in addition to the Learning and Teaching Centre. The basic assessment model is simple to use and it could be disseminated to other areas of the University via electronic media, seminars or workshops.

\textbf{Evaluation}

The evaluation process proposed for this project is relatively simple. The evaluation will comprise a comparison of project performance in assessment of library projects, traditional lab based projects, commercial projects or knowledge transfer projects using standard assessment procedures (\textit{e.g.} submitting two reports; one commercial and one academic as used in Infection and Immunity) and similar projects using the novel assessment strategy. The comparison will focus on relative performance in the project and degree examinations, the impact of the novel assessment strategies on employability and University engagement with commercial partners.

In assessing student performance, a retrospective analysis of performance will be undertaken in relation to the diverse nature of final year projects that have been offered across the Faculty of Biomedical and Life Science. The grade (and secondary band) awarded to the project will be compared to the grade profile for final degree examinations. These data will establish whether the nature of the student project undertaken has an influence on performance outcomes and ensure quality in our assessment procedures. Prospective performance analysis over the next two years using similar comparisons will validate the novel assessment procedures so that they can be applied in diverse learning environments and ensure quality.

In terms of student learning, the novel assessment strategies will have additional benefits to enhance student understanding of what can be achieved by using knowledge and practical skills
developed in studying an academic discipline and transferring them to practical (employment) situations. For example, most students will think that technical skills transfer readily into the workplace while less will realise that critical analysis of the data or knowledge generated is perhaps more important for commercial applications. The novel assessment strategies will facilitate student reflection on their own strengths and weaknesses by demonstrating whether procedures that they designed and implemented in goal oriented tasks were effective. This benefit will be assessed through standard course monitoring activities and by applying specific questionnaires that focus on the student’s perception on how effective their learning has been.

In relation to employability and University engagement with commercial partners, the novel assessment strategy will have additional benefits in relation to student employability. The ability to assess student performance in final year projects in diverse learning environments will open new ‘routes’ for the University to engage with commercial partners. Moreover, it will be possible to incorporate suggestions from the commercial partners into the novel assessment procedures making them ‘stakeholders’ in the educational process and including objective assessment of skills they value and consequently enhance student employment prospects. Moreover, greater engagement with commercial partners and improved understanding of commercial needs is likely to encourage entrepreneurship within our graduates and also enhance academic enterprise within staff. This benefit will be assessed through analysis of graduate employment records (e.g. previous LTDF support to Dr RH Baxendale from the Faculty of Biomedical and Life Science has provided information on the impact of additional vocational qualifications on student employability) and similar follow-up of graduates from project placements with commercial partners using the novel assessment procedures. Employers will also be contacted to determine whether their contribution to objective assessment influenced decisions on subsequent student employment.

**Timetable** (the grey shaded area represents the period requiring support from the LTDF)

<table>
<thead>
<tr>
<th>Timeline</th>
<th>Placement</th>
<th>Validation</th>
<th>Employability</th>
<th>Milestones</th>
</tr>
</thead>
<tbody>
<tr>
<td>July 2010</td>
<td>Establish Placements</td>
<td>Retrospective Analysis of Project Assessment</td>
<td>Retrospective Analysis of Graduate Employability</td>
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<tr>
<td>Dec 2010</td>
<td>Supervise Placements ↓</td>
<td>Co-ordinate Project Specific Assessment Novel Assessment Prospective Novel Assessment Analysis</td>
<td>↓</td>
<td></td>
</tr>
<tr>
<td>March 2011</td>
<td>Establish Placements</td>
<td>Novel Assessment Prospective Novel Assessment Analysis</td>
<td>↓</td>
<td></td>
</tr>
<tr>
<td>June 2011</td>
<td>Supervise Placements</td>
<td>Prospective Analysis of Graduate Employability</td>
<td>↓</td>
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<tr>
<td>Sept 2011</td>
<td>Establish Placements</td>
<td>Co-ordinate Project Specific Assessment Novel Assessment Prospective Novel Assessment Analysis</td>
<td>↓</td>
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<tr>
<td>Dec 2011</td>
<td>Supervise Placements ↓</td>
<td>Employer and Graduate Follow-up</td>
<td>↓</td>
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<tr>
<td>March 2012</td>
<td>Establish Placements</td>
<td>Employer and Graduate Follow-up</td>
<td>↓</td>
<td>2</td>
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<tr>
<td>June 2012</td>
<td>Supervise Placements</td>
<td></td>
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<tr>
<td>July 2012</td>
<td>Establish Placements</td>
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<tr>
<td>Dec 2012</td>
<td>Supervise Placements</td>
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**Milestones** 1 >8 project placements and novel assessments; 2 >16 cumulative project placements and report on novel assessment validity; 3 >24 cumulative project placements and report on employability.
Budget

Salary costs

Support is requested for a part-time research assistant to undertake the evaluation process in relation to analysis of project assessment and graduate employability. Faculty of Biomedical and Life Sciences staff will be able to support project placements through their normal teaching activities for supervising honours projects. However, the applicant’s staff activity profiles make it impossible to perform retrospective and prospective analyses planned and will require assistance in developing project specific assessments. Consequently costs relating to the buy-in of new staff are detailed below.

Travel costs

Since an important aim of this application is to promote University engagement with commercial partners it will be necessary to visit sites off campus. Support is, therefore, requested to for staff travel costs to establish project placements, visit commercial partners during placements to ensure student learning is being supported and to co-ordinate project specific assessments. Travel costs are detailed below.

Consumables

Faculty of Biomedical and Life Science honours projects are funded through relatively small allocations to the project supervisor from the 4th-year teaching budget but these rarely meet the real cost of commercial projects. However, as commercial partners tend to place students in ongoing commercial activities there are no additional consumable costs envisaged (the allocation from the teaching budget will be used to support student travel cost etc.).

Cost details and proposed phasing of spending

<table>
<thead>
<tr>
<th>Financial Year</th>
<th>Salary Costs</th>
<th>Travel Costs</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>2010-2011</td>
<td>£8,313</td>
<td>£365</td>
<td>£8,678</td>
</tr>
<tr>
<td>2011-2012</td>
<td>£8,995</td>
<td>£365</td>
<td>£9,360</td>
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<tr>
<td></td>
<td>£17,308</td>
<td>£730</td>
<td>£18,038</td>
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</tbody>
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Salary costs are based on a 25% research/teaching assistant appointment on Grade 6 starting at spinal point 25 with incremental progression on 1st Aug (inflation is overestimated at 5%). Travel costs are calculated on current car user mileage allowance while estimating three visits to eight placements in each financial year (with an average 40 mile round trip).

Approval

Ethical approval is not required for this application because the study is in practice an audit of normal teaching activities. A supporting letter from the Director of the Faculty of Biomedical and Life Sciences Undergraduate School is appended to the application. The applicants consent to the bid document and final report being published on the Learning and Teaching website.