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Additional Applicants (one per line):

Dr Brian Lawless, School of Physical Sciences
Ms Jennifer Bruton, School of Electronic Engineering (Chair of ME programme)
Dr Sean Marlow, School of Electronic Engineering (Chair of EE programme)
Mr. Charlie Daly, School of Computer Applications (Final year project co-ordinator B.Sc. in
Computer Applications (Full-Time))

Summary

Project Title: Fostering multi-skill development in final-year undergrads through inter-disciplinary project-based activities.

Summary Description:

The final year individual project is recognised across a wide range of disciplines as a very valuable contribution to producing broadly-skilled well-rounded practitioners in their respective areas. This is particularly so, if the project work is situated in an industrial, research group or other practical and motivational context. This Teaching and Learning funding proposal is about seeking support for project-based learning activities that are manifestly multi-disciplinary, team-based and long-term, and provide a practical and motivational context where an industrial or research one is not possible.

The idea of this project proposal is that final-year project students would initially cooperate on a multi-disciplinary, multi-academic final year project to design, construct, commission and use a web-interfaced astronomical telescope. The telescope activity is very useful, not only because it can be highly-motivational, but also because the total project requires the skills and knowledge being developed within mechatronic engineering, electronic engineering, applied physics and computer applications programmes as a minimum. This means that the individuals involved end up not only developing their own discipline skills, but also their ability to operate in a multi-disciplinary team.

The telescope project is a good initial focus (no pun intended) around which to build a multi-skill development activity, but it is intended to be just the first in a series of such inter-disciplinary project-based activities. In other words, this project is not about building a telescope *per se*, but about putting in place the mechanisms for supporting inter-disciplinary project-based-learning activities that would provide long-term benefits to DCU students. Note also, we are not proposing a group project, where the contribution (or otherwise) of an individual can be masked by that of others. Rather we see this as a coordination of individuals interfacing across discipline boundaries.

The funding being applied for in this TLF proposal is seed funding for the first implementation of the long-term initiative described above. Subsequent implementations and aspects of the long-term evaluation of the initiative are likely to be the subject of future funding proposals to this and other sources.

Amount requested (€) from the T&L fund (maximum of €10,000)

3. Strategic Context

What is the strategic context for this project? Detail the connections with the DCU Strategic Plan, "Leading Change", and/or with the Strategic Implementation Programme. Does the project build on any prior or existing teaching and learning initiative? Provide hyperlinks (URLs) to reports on previous initiatives (ODTL supported or otherwise) which are related (if any).

The strategic context of this project can be represented in a number of keywords or phrases: cross-disciplinary, collaborative, open, activity-based, transferable skills.

Under the heading "The networked university: a learning community", the DCU Strategic Plan *Leading Change* insists that universities "... must harness the learning opportunities offered by new technology and must build a dynamic interaction between theory and practice". It continues further on: "[DCU] will develop an e-university strategy combining technology-assisted methods with traditional learning methods. DCU will harness the development of information and communication technologies to address more effectively its key educational objectives and to enable it to link more effectively with the external community. Such objectives include deepening the quality of learning, more effective symbiosis between personal and professional development, more critical thinking and social awareness ...". This pretty accurately captures the spirit of this project: to provide a technology-based motivational context within which to foster key educational objectives in the programmes concerned while simultaneously opening its activities to a wider community outside DCU.

Two prior TLC funded projects in which the principal applicant was involved were based on the technology of web-based support for learning within a particular postgraduate taught module (<http://odtl.dcu.ie/tlf/1999-2000/ref47/>; <http://odtl.dcu.ie/tlf/2000-2001/small-project-00-awards/ref15/>). This project continues the theme of web-centred development of learning, but attempts to make it a more student-centred and student-determined activity than the previous projects.

4. Benefits

Who is expected to benefit from the project (other than the applicants)? What will these benefits be?

This project proposal is solely for the benefit of final year students. The benefit to the applicants is marginal, in that they are all expected to supervise final-year projects one way or the other. If anything, the multi-disciplinary interaction and coordination adds an extra layer of hassle to the supervision of a final-year project. However, we feel that whatever benefits our students, benefits us in the long term and is good for the University, and is therefore worthwhile. Also, the benefits of working in a group activity with well-motivated students is not to be under-estimated but is difficult to quantify.

The benefit to the students is the experience of working in a team and multi-disciplinary environment, on a project where their contribution is crucial and the output bigger than what any one student could achieve individually.

There may be spin-off benefits to the University in terms of PR or profile or enhanced interdisciplinary cooperation among faculty, but this project is not based on these and does not require them for its success.

5. Method

How will the project be carried out, and by whom?

The project will be implemented by the above named faculty or their nominees, in the context of the *existing* individual fourth year project components of the relevant degree programmes and their existing responsibility to supervise these project students. During the active phases of the project work (which are not necessarily synchronised across the programmes) the supervisors and students will aim to meet as a group once per week or otherwise as often as necessary to coordinate the activity. In addition, a web-site with public and private web spaces initially set up by the faculty members, and a group-wide mailing-list, will be used as a means of coordinating the activities.

It is important to distinguish the project which is the subject of this proposal, which has broadly-based teaching and learning objectives and will be implemented by the faculty concerned, and the consequent student-based activity, which is subject- and technology-dependent. While the funding being applied for in this proposal is tied to the technology, it is enabling funding which makes the inter-disciplinary cooperation natural and sensible. The cooperation itself does not need funding at this stage.

6. Pedagogy

What is the pedagogical basis for the project?

The substantial individual final year project is a widely-used pedagogical tool in undergraduate scientific and technical education. The skill development, grounding and integrative benefits are well-established, particularly where the project is situated in an industrial or research group context, where this is possible. This proposal retains all the existing advantages of the final year individual project as all the student projects involved will continue to be carried out under the structures of the relevant programmes. However, it will add extra dimensions of personal and transferable skill development related to acting as part of an ongoing, multi-disciplinary team effort with the motivational advantage of a common goal. This is sometimes already possible in final year projects where the project is situated in an industrial or research group context. However, that is the exception rather than the rule and this proposal provided a further and hopefully scalable context within which DCU students can benefit from a richer personal development environment

7. Scheduling

When will the project be begun and by when will it be completed? Are there any intermediate milestones? Is the timing appropriate to the stated goals? Do you foresee potential obstacles to meeting this schedule?

The fostering of multi-skill development in final-year undergrads through inter-disciplinary project-based activities is intended as a long term goal of this funding application. This application requests funding for equipment that will allow the actual student activities to begin in the academic year 2002-2003. The TLC-funded equipment will need to be purchased before the commencement of the academic year and this ties in well with the September 2002 deadline.

The student activities will be carried out during the academic year 2002-2003 at least. It will be possible to submit one or more interim reports during this period, a suggestion is for the end of semester 1, but it really only makes sense to submit a final report after the completion of CA4 projects in May/June 2003.

8. Evaluation

What plans have you built in for evaluating the effectiveness of the project? Are there opportunities for feedback at all stages of the project development and for all participants in the project?

It is envisaged that the students involved in this project would agree to participate in an evaluation of the project at the end of the 2002-2003 academic year, conducted by a suitably qualified person from outside the project. This, coupled with feedback from the various external and internal examiners involved would provide the basis for the overall project evaluation. As stated above, the

subject matter for this project is somewhat incidental. Whether or not it is successfully constructed is not directly material to the achievement of the aims of the project. The principal outcome of this project will be a specification of how intra- and inter-disciplinary skills of participating students can be further improved in subsequent years.

If funding is required to implement the external evaluation process described above, the expense would be incurred during the academic year 2002/2003 and it would thus be the subject of a further TLF funding application relevant to that period. However, in order that this project not be contingent on funding for evaluation, a commitment is being made to include in the final report an element of direct student and external examiner feedback on the success and benefits of the overall project. As mentioned above, the supervisors and students will aim to meet as a group once per week or as often as necessary to coordinate the activity and give feedback and assistance where necessary.

Intrinsic to the proposed student project activity is a web-based interface to operate and return images from the telescope. It is also intended that a project home-page would be maintained to disseminate the activity throughout the student and staff body within the University and to interested parties outside. It is not known yet whether the work will give rise to opportunities for academic publication of the teaching and learning benefits accrued, but this possibility will be maintained as a activity that will be pursued if the opportunity arises.

9. Dissemination

The TLF is a University designated fund: it is therefore very important that the deployment of the fund be open and transparent and that, as far as possible, it provides benefits to the widest University community. The Office of the Dean of Teaching and Learning co-ordinates a variety of activities through which to publicise and disseminate the outcomes of TLF awards. Recipients of awards are expected to co-operate with such activities, including honouring the obligation to submit one or more reports which will be made available via the ODTL website.

This proposal is designed with the intention that dissemination of its goals, methods, activities and outcomes would be integral to the implementation of the proposal. This is firstly through the fact that the project is intended to have an enduring web presence as a primary goal. This leads naturally to the conclusion that it should have a web-presence during its development also as a mechanism for describing what the pedagogical and developmental progress of the project is, in addition to its direct activity. In both cases, it is envisaged that students participating in the project would be the developers and maintainers of the associated web pages, with the staff involved providing the initial presence before the student activity commences.

As the aim of this proposal is to make the project as student-centred and as activity-centred as possible, it is envisaged that during the first academic year of the project's operation, the student team would make a seminar presentation on the project, supported by the staff involved where necessary.

The nature of the subject matter of this proposal is such that it may attract other opportunities for journalistic promotion and where possible the student team will be encouraged to exploit these. As before, the staff involved will assist and direct and give feedback on these activities to maximize the benefit to the students involved.

10. Detailed Budget

Please provide a detailed breakdown of the budgeted costs of the proposed project. If the total is different from the amount being requested from the TLF please indicate how the balance will be funded. State why this project should not be funded within the budgetary allocation of your own School or Unit. Explain how any future costs that may be involved in maintaining the benefits of this project will be borne. Comment on the overall financial justification of the project.

A relatively small amount of financial support for individual fourth-year projects is available within the respective Schools. Consequently, necessary expenses that arise during the students' activities can be covered. However, the available support would never be able to cover the expense required to kick off a project like this. The funding being applied for here is not direct funding for a teaching and learning activity but enabling funding to purchase the raw materials that will allow the described teaching and learning activities to take place.

The most significant future cost directly arising out of this project would be expenses associated with a thorough evaluation of the project. As described above, this is a funding proposal that would need to be framed in a 2002/2003 funding round.

The project is described above as a long-term initiative and funding is only being applied for here for an initial phase centred on the construction of a telescope. It is envisaged that this initial phase would lay down a framework for cross-disciplinary cooperation that could be availed of for future phases involving different technology goals. However, we do not attempt to speculate what these topics might be here, only to point to their opportunity arising out of the framework put in place for this project. (An exception is a dome to house the telescope, which again is a multi-disciplinary undertaking. It is not costed in here as it is felt that other funding sources should be used to support this and the student project activities involved in this project do not depend on it).

The amount applied for is our best estimate (based on expert advice) of what it would cost for the major materials and components to build a 20-inch reflecting telescope without a dome. There is some scope to adjust these costs based on smaller target telescope sizes, but the proposers would ask that variation in these costs would only happen in conjunction with expert input to maintain the viability of the project.

Budget (in euro)

Expenditure:		
Manpower	None	
Equipment	Telescope mirror, optics	€500
	Mount, tube and drive materials	€200
	Imaging device components	€1500
	Interfacing components	€1000
Amount being applied for:		€8000

11. Evaluation of the Application Process

If you have any comments, critical or otherwise, on this application form, or any other aspects of this TLF scheme, please provide them here.

12. Other Information

Finally, if there are other brief points which do not fit under any of the previous headings but which you wish to highlight, please enter them here.

The proposers wish to acknowledge the input and advice received from Dr Hugh Masterson in the School of Physical Sciences in preparing this proposal.