ID-02 Interdisciplinary Initiatives: Undergraduate Research Opportunities Programme (UROP)

'UROP placements' or 'vacation research scholarships' began in an organised way in the US at research intensive universities such as MIT (Massachusetts Institute of Technology) in the 1960s. The idea of involving undergraduates in cutting-edge research sprang from many sources – partly it cultivated the minds of those students who were most engaged and were interested in going on to do research-based degrees and partly, from the government point of view, it was seen as a way of sustaining the knowledge economy of the country, helping to bring on the next generation of researchers.

Whereas MIT has the largest programme in the US, most of the other research intensive campuses have similar programmes (e.g. Stanford). In the UK such schemes are most embedded at Imperial College, but have started up over the last few years at Warwick and Cambridge; Nuffield & Welcome Trust also fund such schemes.

At Reading, there has been a long tradition in some subject-areas of students engaging with Academics in their research, sometimes through the use of Nuffield and Welcome Trust scholarships, sometimes using other funding sources. In 2005, the University's achievements in linking teaching and research were recognised in the funding and creation of a Centre for Excellence in Teaching and Learning, specialising in Applied Undergraduate Research skills (CETL-AURS). Funds from this will be used to create a UROP scheme here.

In the first two years of running, the UROP programme has proved successful. The pilot scheme run in 2006 saw 17 placements filled in the core subject areas. Student feedback was very positive:

'This project was a superb opportunity to gain an insight into university research…'

In 2007 we received 43 proposals, of which 30 were approved and all of the placements have now been filled. The scheme has been broadened this year to cover all Faculties.

The UROP programme has been raised at the Committee on University Bursaries and Scholarships with agreement in principle obtained for funding to continue from this source after the CETL ceases, thus ensuring the sustainability of this project.

Project Code: ID-02   **Discipline: Interdisciplinary Projects**   **Project Title: Undergraduate Research Opportunities Programme (UROP)**
Description: UROP schemes began in the United States at Universities such as MIT. Here Academics saw it as their responsibility to bring forth the next generation of research students and did this by building in bursaries for undergraduates to work with staff during the summer vacation on research projects. UROP schemes help to develop students' research skills and encourage them to think about continuing to do research. The UROP programme at the University of Reading will be piloted and developed with CETL-AURS funding but seek to develop other sustainable sources of funding.

A **What is the perceived problem or challenge?**	B **Enabling Factors** What resources will facilitate the project?	C **Processes** How is this project going to be achieved?	D **Objectives** What is the end product or result of the project?	E **Evaluation Data** What methods will be used to demonstrate the success or impact of this project?	F **Unintended consequences** What have been the unintended consequences of enacting this project?
National Agenda **Challenge**: *'We see an understanding and valuing of research and to an extent the development of skills of doing research, as being central to what all students should experience in HE'.* *HEA Institutional Strategies to linking Teaching and Research.* **Challenge:** in order to foster the knowledge economy the sustainability of the UK research base needs to be considered and fostered and talent spotted and invested in at an early stage. **The staff perspective** **Problem:** There is a tension between teaching and research across the University. Undergraduates can often be seen as a distraction from research. **Problem:** Academic staff probably spend more time dealing with 'problem' students than engaging with and rewarding the most gifted. **The student perspective** **Challenge:** Students should not only benefit from the results of research but also actively engage in the research process.	**UROP Funding** Providing payment will overcome economic barriers to student participation. **UROP Staffing** CETL core staff will organise and develop the UROP scheme and seek to embed it into University practice for post-CETL funding sustainability.	CETL staff will develop structured **guidelines and systems** for UROP placements, that will: ensure a minimum standard of student benefit is embedded into the design of each placement ensure that selection of which placements projects to fund is based on transparent criteria guided by the maximum benefit to students ensure that a fair selection process for student recruitment is embedded into the design of each placement support PIs through University procedures for approving recruitments and making appointments so as to avoid problems or delays with payment to students A pilot set of placements will operate in 2006 in the core CETL subject areas. In 2007 these placements will be rolled out to be competitive across the University in all subject areas.	**The student perspective** Support the development of students' research skills related to their own discipline (learning to **do** research) Enhance undergraduates' appreciation and understanding of research in their discipline (learning **about** research). Support the development of students' transferable professional skills Reinforce or increase students' desires to continue to postgraduate study. Encourage students to reflect on their current level of skills prior to the placement and plan for future personal and professional development. **The staff perspective** Support the research output of staff, advancing existing projects and/or providing seed-corn funding to help the development of future research grant bids. Incentivise the linking of T&L by supporting staff research outputs. **National Agenda** UROP placements may help to develop student aspirations to engage with research. Evaluations may generate data that shows that undergraduates are an under-tapped resource who can contribute to the knowledge economy.	**Evaluation of the individual experience** 1. Post-UROP evaluation form for the student 2. Post-UROP evaluation form for the Principle Investigator **Evaluation of the cumulative effect upon the University** 3. Number of student placements each year, funded by various means: a. CETL-AURS funded b. Nuffield Funded c. Welcome Trust Funded d. Bursaries built into grant applications e. Bursaries built into University and Faculty studentships e. Alumni donations Possible National Impacts 4. Is there quantitative and/or qualitative evidence of the impact of these schemes in a UK HEI setting (as opposed to US)? 5. Has RC-UK accepted the idea that UROP bursaries can be included within grant applications? 6. Are the numbers of UROP programmes across the sector increasing?	

ID-02 Interdisciplinary Projects:

Undergraduate Research Opportunities Programme

1.   Project Progress and Timeline

1.1   Timeline

Done	Project stage post	Planned end date	Actual date
☒	Researching existing UROP schemes	Mar 06	Mar 06
☒	2006 Reading UROP pilot placements allocated	May 06	May 06
☒	Drafting context and forms for UROP website	Dec 06	Dec 06
☒	Clarification of processes with Univ. Admin	Jan 07	Jan 07
☒	Website content mounted and online	Jan 07	Apr 07
☒	2007 Reading UROP application deadline	Apr 07	May 07
☒	2007 Reading UROP allocation of scholarships	May 07	June 07
☐	2007 Reading UROP evaluation of placements	Oct 07	-
☐	Revisions to website and procedures	Nov 07	-
☐	Design of pedagogic research project into UROPs	Nov 07	-

1.2   Enabling Factors: State the resources used in this L&T-enhancement project

When the University made its bid to HEFCE to establish a CETL in Applied Undergraduate Research Skills, part of the budget was allocated to establishing an 'Undergraduate Research Fund'. After research in the first year of the CETLs operation, it was decided that the establishment of a UROP scheme was the most appropriate way of deploying this resource, using an established methodology which had some research in the US behind it supporting its effectiveness and impact (see below under pedagogic research). The total sum in the recurrent budget over the 5-years is £110K, which can fund around 80-90 six-week placements at c. £210 a week, excluding administration costs.

The project is led by John Creighton (CETL Director) with the assistance of the CETL project officers: predominantly Joanna John working on developing processes and content for the website in the autumn of 2006 and Sarah Holling clarifying processes and procedures and mounting the content of the website in the spring of 2007.

1.3   Processes: What were the key challenges in delivering this project?

Researching UROP Schemes: Researching UROP schemes in the UK and abroad was relatively easy and contacts were made.

Streamlining administrative processes: The pilot scheme in 2006 proved more problematic than it should have been, but the problems largely all related to making payments to students. At the time the University was tightening up on its ways of paying fees in excess of £1000 to people, and insisting that they had contracts rather than being paid on 'blue forms'. It was therefore decided that there should be formal contracts (even though practice in other universities was to treat them as scholarships).

Staff were advised that they could have students on placements, but many initiated the placements before any staffing requests had gone through, and before the requisite

information to enable payments to be made to the students had been obtained. This resulted in subsequent annoyance that students had not been paid. Subsequent discussions to clear this problem up have established the taxation situation, and the payments will now be treated as Scholarships through research accounts, with one staffing request form going through each year for the total number of placements being offered.

Following the pilot, issues surrounding 'intellectual property rights', 'health and safety', and 'public indemnity insurance when working off campus', were all discussed and clarified with the other relevant parties in the University. All the information is now clear in the documentation so that all parties (PIs and students) are clear about their roles and responsibilities, and forms have to be signed off by the Heads of School. Since the students are not going to be formal employees, clarification on all these issues was essential.

Application forms have been drafted which should cater for all the information which the UROP/CETL office require, as well as HR and Research accounts, with a clear streamlined process. We await the completion of the 2007 programme to find out what additional alterations need to be made to make this work as smoothly as possible with Reading's administrative structure.

Creating the UROP website: this has been a larger challenge than anticipated, largely because of unfortunate timing in that the University was undergoing a re-branding exercise and development of a new web-content management system (WCMS) at the same time as the UROP website needed developing. The WCMS was significantly behind schedule, so in the end the UROP website was designed using the old style-sheets and will have to be re-cast at the end of 2007 to the new templates.

Diversifying funding: CETL funds will cease in 2010. In order to make this project sustainable it is important to begin looking towards finding other funding streams and develop them now rather than wait until 2010. Several strands are currently under investigation:

- funding through the *Committee on University Bursaries and Scholarships* (CUBS). An approach has been made to this committee to start funding this scheme as full-fee students pass through from their second to third year (summer of 2008). The result of this will be known shortly.

- funding through alumini. This will be investigated once the website and the 2007 programme has been completed and there is a clear web presence with case-studies on it.

- funding placements as part of large research grants with research council money. This requires a change in attitude of Research Councils UK. While some Councils fund vacation scholarships (EPSRC and BBSRC), the others do not. The approach being taken here is in common with managers of other UROP schemes, that of promoting the benefits of these at national meetings (e.g a paper was given to a joint HEA/RCUK meeting in London in November 2006). It is also clear that pedagogic research is required by RCUK to justify going further in this direction. It is possible for CETL-AURS to plan to do this (see section 4.2 below).

2. Outputs and Evaluation

2.1 List the evaluation evidence/data collected

Date	Quantitative/ qualitative	Evaluation by	Description / Method
ongoing	Quantitative	Monitoring Data	No of UROP placements.
Oct 06	Qualitative	Students	Feedback questionnaire on UROP placements
Oct 06	Qualitative	UROP PIs	Discussions about what worked/didn't work on their placements.
Mar 07	Qualitative	Students and Staff	Selected staff and students looking at our draft website and forms to provide feedback.

2.2 Summarise the key results from your data

The research phase went well, and contacts were made with teams managing UROP schemes at Imperial, Cambridge, Warwick and Oxford Brookes. This also led to invitations to seminars by Elaine Seymour of the University of Colorado at Boulder USA, who has researched these schemes in the US when she was over here.

The pilot scheme in 2006 worked well, apart from the issues surrounding payments to the students. The problems and processes have been identified and steps put in place to rectify this for this current year.

17 students undertook placements in the 2006 pilot scheme from Agriculture, Archaeology, Classics, History of Art, Typography and Zoology Programmes. We learnt a great deal during and after the pilot in terms of streamlining university processes so that these placements could become 'admin-light'.

Student feedback includes:

'This project was a superb opportunity to gain an insight into university research… research can be targeted but also remains a process of discovery… there is actually no telling exactly where you will end up'

Andrew Young, UROP in Typography

'I was able to develop my project management and self management skills which will be of great benefit to me when undertaking further academic research.'

Jenny Guildford, UROP based in MERL.

'I was motivated to undertake this UROP … to gain experience in carrying out a research project in order to help me with my final year project, and to help me decide whether to continue on to a MSc or PhD at a later date… It has been far more enjoyable than the work I would have been doing instead! Fantastic!'

Demain Lyle, UROP based in Zoology.

In 2007 we offered 30 placements. We had 43 applicants, which came from all faculties, though the majority came from Life Sciences and Sciences rather than the Faculty of Arts and Humanities of the Faculty of Economic and Social Sciences.

2.3 How would you, as the PI, summarise the success of this project?

Embedding this project is one of the cornerstones of CETL-AURS, and there is a long way to go until resourcing it on a secure footing is achieved. However, the scheme is now up and running, and papers are being given about it at other universities and conferences. The scheme's profile is gradually building within Reading and elsewhere. Reading will now appear alongside Cambridge, Imperial and Warwick in national listings of Undergraduate Research.

It has been particularly pleasing how supportive and engaged Reading University Students' Union has been through their Vice-President Education, Ryan Bird.

The predominance of applications from the Sciences is not surprising since schemes like this have been funded in these areas for many years now by Nuffield and Welcome; but it does mean the project team will have to make a specific effort to target Arts and Humanities colleagues next year. One academic in that Faculty was reported to have seen one of the UROP posters which had a student holding a test-tube on it, and saying that it clearly was not an initiative meant for them. Because of this some deliberately humanities focused promotional material will be created for net year.

3. Impact and Consequences

3.1 How many students (and at what level and in which programme areas) has this L&T enhancement project impacted on?

The pilot in 2006 saw 17 placements filled. The places were offered in the core subject areas involved with CETL-AURS, so they went primarily to students in the fields of Agriculture, Archaeology, Typography and Zoology. However some of the placements amongst the University Museums and Collections also included students from Classics and History of Art and Architecture.

In 2007 we received 43 applications from PIs covering every Faculty within the University, and of these 30 were awarded. The PIs are currently in the process of interviewing students to fill the placements.

3.2 Has this project positively contributed to the teaching environment and satisfaction of the academic staff delivering this provision?

In the pilot year the placements were offered to the CETL Fellows in the core subject areas to appoint. This was done to (a) keep the pilot placements in areas where good contact existed with the CETL office, but also (b) as an aspect of reward and recognition to these staff and their colleagues, helping them push forward their own research agenda while also benefiting students.

3.3 Summarise the unforeseen consequences of this project

Planning to become involved in pedagogic research on this subject was not anticipated, but there is a clear national need for this work to take place, and since HEFCE funding of CETLs hoped for pedagogic output from their investment this appears to be a place where we can genuinely make a contribution. This would involve studying our own and other's schemes (see 4.2 below).

4. Dissemination

4.1 Log dissemination activities relating to this L&T Project.

Date	Main Audience	Type	Dissemination activity
Oct 05	UoR Academics	Awareness	Article in '*Teaching Matters*' T&L Newsletter
Oct 06	UoR Academics	Awareness	Article in '*Teaching Matters*' T&L Newsletter
Oct 06	HEA/RCUK/Academics	Awareness	Discussion of Reading UROP in workshop at 'Research-based learning in HE, the Warwick Experience', at Warwick (HEA sponsored)
Nov 06	HEA/RCUK/Academics	Awareness	Presentation on Reading UROP to 'Bringing research and teaching together', at Millennium Hotel, London (HEA/RCUK sponsored)
Spring 06	UoR Academics	Information	Presentation on Reading UROP and CETL-AURS to Faculty Boards for T&L (3 of 4 of them)
Mar 07	HEA-SC Bioscience	Awareness	Presentation on Reading UROP to 'Developing Enquiring Minds: Linking Teaching and Research', at Napier University (HEA sponsored)

4.2 Beyond this evaluation, do you see any scope for pedagogic research in this area of learning?

Yes. Doing pedagogic research in this area is fundamental to spreading such schemes across the HEI sector, and convincing Research Councils of the value of either directly funding such schemes or at least allowing for funds for UROP placements to be incorporated into large research-grants.

The tradition in the US is very different to the UK. There one of the criteria for the National Science Foundation awarding research grants is undergraduate involvement, such as in the form of UROPs. This is seen as a way of bringing on the next generation of researchers and sustaining the knowledge-economy.

In the UK, the Research Councils stated position is that they do not fund research training within grants, only research. They see UROP schemes as training and state that if a research grant application includes money for a placement, they will cut it out. On the other hand, quixotically, they say that if the project works and such a placement were funded as part of it they would turn a blind eye. But the tide is shifting. Two Research Councils (BBSRC and EPSRC) are now funding vacation scholarships by giving to 'select' universities grants to run and administer these. BBSRC's pilot was in 2004, with approximately 80-100 scholarships currently distributed largely in line with PhD quotas. Where two Research Councils go, others may follow. Dr Ian Lyne (*Chair, Research Careers and Diversity Group, RCUK*) is leading on this, but is also concerned that concrete evidence of the impact of Vacation Bursary schemes is difficult to obtain. Nonetheless there does seem to be a clear range of secondary benefits to staff and students. Students gain a more

realistic experience of the nature of a research career while staff are enthused and motivated by the experience of having a vacation student.

CETL-AURS hopes to undertake a pedagogic research project into the benefits of UROPs following a methodology of NSF-funded work in the US evaluating UROP schemes there. This work, if the results are positive, is designed to help facilitate evidence-based change in the sector and to encourage RCUK to continue in its developments in this direction. The work in the US by Elaine Seymour particularly looked at STEM disciplines (science, technology, engineering and mathematics). It used an ethnographic methodology, with semi-structured interviews with students and PIs, transcribing these and coding them for specific types of statements about how they viewed UROP placements: e.g. Seymour, E., Hunter, A-B., Laursen, S., & T. DeAntoni (2004) "Establishing the Benefits of Research Experiences for Undergraduates in the Sciences: First Findings from a Three-Year Study." *Science Education (88)*4:493–534.

Project Developer's names:

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