

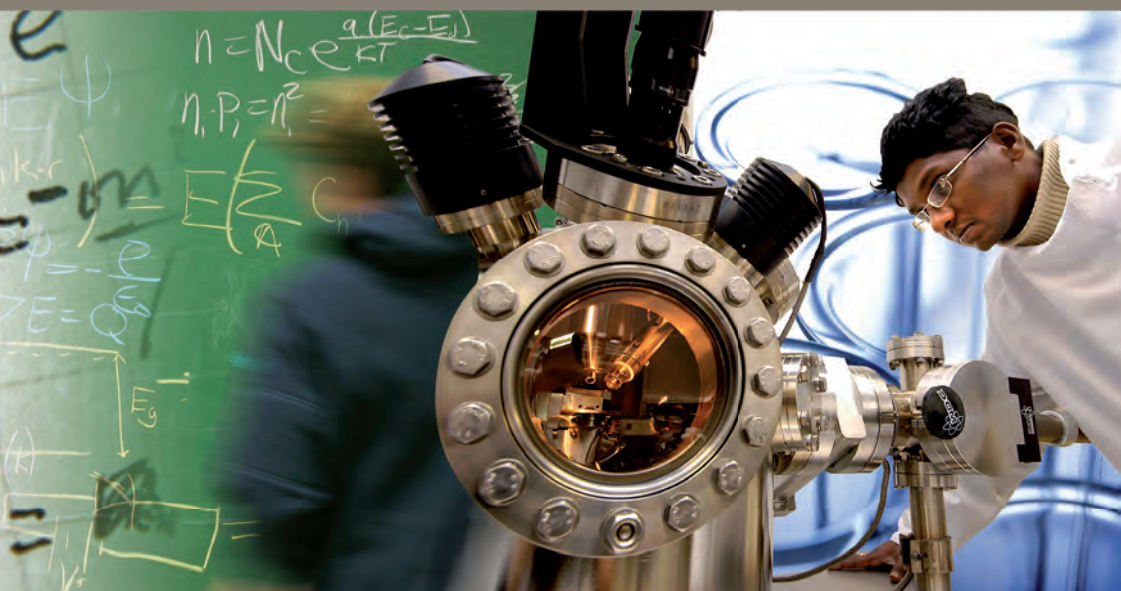
The Collaborative Practice Transfer Fund

Successful applications



www.hestem.ac.uk





In March 2010, a total of 78 applications were made to the National **HE STEM** Programme's Collaborative Practice Transfer Fund, which was issued to enable colleagues in Higher Education Funding Council of England and Higher Education Funding Council of Wales funded Higher Education Institutions to adopt tried and tested approaches, resources or ideas. These 20 projects therefore represent collaboration in support of the transfer and embedding of existing, evidence-based proven practice between colleagues in a total of 31 HEIs, four professional bodies, two private sector companies, two Higher Education Academy subject centres, one sector skills council, one science learning centre, one independent charity, and one sixth form college.

To find out more, please contact the project lead directly or email info@hestem.ac.uk. Outcomes from these projects will be made available from www.hestem.ac.uk



National
HE STEM
Programme



Embedding resources for distance learning

Project lead:

Tina Overton, Department of Chemistry
University of Hull

Collaborating Institutions:

Royal Society of Chemistry; Higher Education Academy Physical Sciences Centre

Abstract:

The Chemistry for Our Future (CFOF) programme invested in the development of resources to support part-time education in chemistry. These resources comprised four 20 credit modules covering organic, inorganic, physical and analytical chemistry. One of these modules was developed at the University of Hull and was successfully piloted with part-time students. The aim of this project is to develop an existing Foundation Degree in Chemical Science from part-time day release mode to distance learning mode, embedding the CFOF-funded resources, and increasing access to higher level skills development to those in full-time employment.

Deliverables:

- Foundation Degree in chemical science delivered by distance learning available to those in the Yorkshire and Humber regions and nationally
- 240 credits of learning resources at level 4 and 5 which will be made available through the open educational resources initiative
- Research evidence on the implementation of distance learning, work-based learning and the student experience

£6,000 awarded by the National HE STEM Programme

Chemistry – South West: Sharing best practice in widening participation

Project lead:

Bridgette Duncombe, Department of Chemistry
University of Bath

Collaborating Institutions:

University of Exeter; University of the West of England; University of Bristol;
University of Plymouth

Abstract:

This proposal aims to identify and build on examples of best practice found in Higher Education Institutes in the South West as well as from the pilot project of the Royal Society of Chemistry (Chemistry for Our Future) and embed them into widening participation activities across the region. The aim is to pool skills and resources such as recruitment, training and mentoring of graduate and undergraduate students across the region in order to support widening participation activities. One output will be a pool of voluntary peer science communicators trained to the same high standard. An additional benefit will be the creation of a sustainable discipline-based network of practitioners across the region who will be ideally placed to (a) lead the embedding of good practice into their departments and (b) lead further initiatives under the **HE STEM** Programme.

Deliverables:

- To enable students from less traditional entry routes to cope better with the rigours of a demanding engineering programme as offered at Nottingham
- Stronger ties between both Higher Education Institutions and widening participation schools
- Establishment of a panel of teachers from across the region to advise and guide resource development and activity
- Creation of a sustainable network of chemical science practitioners interested in the transfer of best practice and development of innovative educational tools

£10,000 awarded by the National HE STEM Programme



A proactive intervention to facilitate transition to HE for engineering students with non-typical mathematical backgrounds

Project lead:

Stephen Hibberd, School of Mathematical Sciences
University of Nottingham

Collaborating Institutions:

Loughborough University

Abstract:

This project will seek to address the issue of mathematics provision for engineering students who do not have a recent GCE A-level in the subject. Drawing upon emerging observations from the sigma Centre for Excellence in Teaching and Learning and pedagogic research presented at recent conferences of both the Institute of Mathematics and its Applications and the Mathematics, Statistics and Operational Research CETL, this project will embed research outcomes targeted towards the enhancement of curriculum augmentation, in order to assure positive outcomes from a single core provision through appropriate integrated support, and to monitor and disseminate outcomes widely. Target students will include those who have been defined 'at risk' of failing in the transition to Higher Education and those associated with widening participation initiatives, with the aim of further improving retention. The resulting system of support will enable engineering courses to admit suitable 'non-typical' (e.g. diploma) students without recourse to a Foundation Year. Support will be developed through selected and specifically trained postgraduate student teachers, who will also benefit from extended opportunities to enhance their skills.

Deliverables:

- To enable students from less traditional entry routes to cope better with the rigours of a demanding engineering programme as offered at Nottingham
- To engage with other Higher Education Institutions in the development of more flexible and targeted strategies to support students in engaging with engineering mathematics

£9,900 awarded by the National HE STEM Programme

Enhancing the impact of chemistry outreach by use of selected, repeated interventions and collaborative university provision

Project lead:

Neil Williams, School of Pharmacy and Chemistry
Kingston University

Collaborating Institutions:

Imperial College; University of Greenwich; Queen Mary, University of London

Abstract:

The evaluation report of the Higher Education Funding Council of England Chemistry for Our Future pilot project noted that the greatest impact of outreach events was for students who already had some interest in chemistry but remained undecided about future plans. Repeated and/or early interventions were identified as potentially having greater impact than a more general approach. This proposal is designed to embed outreach collaboration between university chemistry departments in the London region hence sustaining activity beyond direct HEFCE funding. To achieve this, the impact of such activities needs to be enhanced in order to benefit the stakeholders sufficiently given the investment in time and resources. The use of selected repeated interventions has been identified as a way of achieving this. In addition the collaborative approach has proved successful in the London region and offers a number of other benefits to the stakeholders. This proposal is aimed at running a collaborative follow-on outreach event for (yr 10-11) students who attended a previous CFOF outreach activity (for yr 9-10 students) and evaluating the impact that a repeated intervention has on students' opinion of the future study of chemistry. The results will be disseminated and inform future outreach activity by chemistry departments in the London region.

Deliverables:

- Collaborative event, with five London universities and Exscitec, involving student ambassadors
- Evaluation of impact of this event and dissemination of results of this evaluation

£2,300 awarded by the National HE STEM Programme

The transition into engineering: Scoping diagnostic and support tools

Project lead:

Peter Goodhew, School of Engineering
University of Liverpool

Collaborating Institutions:

Cogent Sector Skills Council; Liverpool John Moores University; University of Bolton; Queen's University, Belfast

Abstract:

The University of Liverpool, in collaboration with some of its UK partners in the Conceiving-Designing-Implementing-Operating initiative (www.cdio.org) has developed a diagnostic tool for assessing aspects of the knowledge and experience of incoming engineering students. This tool has been focussed on entrants with conventional backgrounds, e.g. those who enter through the traditional A-level route. Through this collaborative project, we now propose to share and extend this tool to embrace applicants who enter engineering courses from differing and less conventional routes, for example apprentices and diploma students, and those potentially entering through workforce development programmes. Using this tool, Higher Education Institutions can quickly identify areas of academic and practical strengths and weaknesses, allowing the support of entrants from the beginning of their undergraduate studies. Using the facilities and expertise of Cogent Sector Skills Council to help develop skills diagnostic techniques and analyses, these prototype tools would be developed in time to trial them with the incoming (October 2010) cohort of students. Based on this initial cohort study, evidence will be used to inform and develop the undergraduate curriculum to deliver support solutions to future students and employees.

Deliverables:

- Extension of content of the diagnostic test to skills and know-how which might be appropriate to entrants from non-conventional (e.g. apprentice, diploma or FE) backgrounds
- Development of an interactive and online questionnaire to deliver a suitable diagnostic test and robust results analysis
- Scoping of content of, and sources for, support material to fill the gaps identified after diagnosis
- Trial of diagnostic test and some of the support material with first year engineering students at Liverpool, Liverpool John Moores, Queen's and Bolton Universities
- Trial of diagnostic test and support material with the first cohort of employees entering the Working Higher Foundation Degree in Nuclear Engineering
- Selection of examples of typical entrants, sharing the diagnostic results between the current partners, with CDIO partners nationwide, and with members of the STEM initiative
- Good working practice in the delivery of the online (open and free) diagnostic test with the links to support resources

Science Van / Gwyddfan: physics-based outreach, evaluation and prompt dissemination to HEIs in Wales and border regions

Project lead:

Debra Croft, Centre for Widening Participation and Social Inclusion
Aberystwyth University

Collaborating Institutions:

Institute of Physics, Swansea University

Abstract:

Aberystwyth University has considerable experience in outreach activity – in primary and secondary schools, and in public/community contexts. The Science Circuit project has completed phase I and II, with major expertise in delivering science in innovative and exciting ways, working with the Wales-wide Hands on Science programme and the Reaching Wider Partnerships. However, it has largely concentrated on biology, forensics, geology, and earth and environmental sciences. ‘Science Van / Gwyddfan’ would like to take the expertise and evaluations from Science Circuit, the Institute of Physics Lab in Lorry, the IoP Physicists and Primary Schools Project plus the development of the Chemistry Roadshow in Bangor, in order to trial a new set of outreach experiments in primary schools in the Communities First areas of Ceredigion during the summer and autumn terms, in addition to some public events for all ages over the summer holidays in rural areas of Ceredigion and Powys. This experience will then be evaluated and written up as good and effective practice for communicating to Higher Education Institutions throughout Wales (departments and widening access colleagues), as well as Aim Higher partners in the West Midlands and border areas, in September 2010.

Deliverables:

- The Science Officer, together with student ambassadors, will deliver sessions to the seven Communities First rural primary schools in Ceredigion (years 5 and 6) during the Summer and Autumn terms
- The Science Officer, together with student ambassadors, will run three roadshow-type open day events in Ceredigion and Powys, building on the combined experience of past work and the new primary school sessions; one of these will be an opportunity for the Bangor team to evaluate our programme
- The work of the 4-5 months will be further evaluated (on an ongoing basis) and combined with previous experience into a best and effective practice handbook for rural outreach delivery for HEIs in Wales and borders
- Members of science departments in other HEIs will be invited to the activities in the summer of 2010
- In the long-term, the physics workshops and experiments will be added to Aberystwyth University's ongoing outreach activity, with a commitment to work with the Physics Buskers (under and postgraduates) and other science undergraduates to improve public engagement and communication skills

£13,679 awarded by the National HE STEM Programme



Curriculum impact: making explicit links from the HE mathematics curriculum to applications in science, technology, business and industry

Project lead:

Vivien Easson, School of Mathematical Sciences,
Queen Mary, University of London

Collaborating Institutions:

Institute of Mathematics and its Applications

Abstract:

Queen Mary will work with the Institute of Mathematics and its Applications and **HE STEM** Programme spokes to run a one day London based workshop in July 2010 for representatives of industrial and business sectors to meet with academic staff from mathematical sciences departments across the UK. The goal of this workshop will be to examine resources developed between 2008 and 2010 and to provide impetus for improving and transferring this practice and resources to STEM departments in other Higher Education Institutions. A glossy brochure and MPeg will be produced for dissemination from the workshop. The resources come from three sources: the IMA, More Maths Grads and from work running this spring at Queen Mary. The Maths Careers website managed by the IMA and "What's the Point of...?" poster and DVD resources developed for Key Stage 4/5 by More Maths Grads, will all be highlighted. The project leader has also obtained funding for a project (2010-11) entitled 'Communication and Employability Skills for Undergraduates in Mathematical Sciences' – the project officer for which will assist in the organisation of the workshop. The first output of that project will be a document linking the Queen Mary mathematics undergraduate curriculum to applications in science, technology, business and industry.

Deliverables:

- Production of the publication entitled 'Explicit links from the HE mathematics curriculum to applications in science, technology, business and industry'
- Short MPeg video showing employers answering the question 'What do you want from maths graduates?'
- Final report and case study giving indications for further development of resources (for students, HE staff or employers) highlighting links between HE mathematics curricula and applications

£9,480 awarded by the National **HE STEM Programme**



Lancashire STEM symposium – “Did you know...?”

Project lead:

Alan Darragh, Engineering Department
Lancaster University

Collaborating Institutions:

University of Central Lancashire; Blackpool Sixth Form College

Abstract:

This project will promote the study of STEM subjects at University and the possible graduate career opportunities available to pupils and teachers in and around the Blackpool and Fylde area. This will be achieved via fortnightly events in the form of a symposium to be held at Blackpool Sixth Form College which will act as a central hub. Following on from the success of “Meet the Scientist” based events offered at Manchester Museum of Science and Industry (MOSI) and Lancaster University (Faculty of Science and Technology and the School of Health and Medicine), the University of Central Lancashire will provide the organisational support and arrange speakers to offer a range of current and up to date lectures/workshops and activities. Each symposium will also include a Q&A session with graduate scientists from the appropriate discipline spanning a range of careers as well as current undergraduate and postgraduate students describing student life. This programme will run between October and December 2010, acting as a pilot to determine best practice for what is intended to be a longer term programme of activity to encourage ‘hard to reach’ students to consider STEM as a career destination.

Deliverables:

- Roll out of tried and tested programme of symposia in the North West region, backed by the Higher Education Institutions in and around the respective areas (Burnley and Blackburn Colleges)
- Increased engagement with schools in the Blackpool and Fylde area to promote HE and STEM
- Online resources made available for other schools/colleges who are unable to attend
- Details of the project to be reported via a monthly schools bulletin and via college and HEI websites

£10,000 awarded by the National HE STEM Programme



Luggage lab

Project lead:

Sean Ryan, School of Physics, Astronomy and Mathematics
University of Hertfordshire

Collaborating Institutions:

Institute of Physics; East of England Science Learning Centre

Abstract:

Attracting students to study physics through Access to HE is a national priority. Luggage Lab will strengthen students' interest in and commitment to physics by exploiting their preference for practical activities. It will develop six self contained, high impact experiments which can be taken to schools in supported outreach or made available as loans. It expands on the Stimulating Physics Programme, in particular the 'Teacher Support' element of the 'demand strand', and will tie into and build upon the resources within the Stimulating Physics Network of 276 partner schools. The experiments will be supported by standalone multimedia packages which students can explore outside class. The experiments and support materials will promote positive gender and ethnic minority practices, e.g. echoing the importance of practical work for building enjoyment in physics. The project will support non-specialist teachers of physics who may lack the experience or confidence to develop and interpret advanced experiments, which may have shut them off from this important aspect of teaching physics. The project takes some of its inspiration from Lab in a Lorry. Approximately half of the funding will be used to purchase kit, while the other half will fund a developer to implement the experimental packages and support resources.

Deliverables:

- Six self contained, simple to use experiments in easily transportable luggage style packages
- Print and multimedia support resources covering technical and health & safety aspects, background science, historical and modern context, and interpretation of the experiments
- Descriptions of lessons learned including experimental details and case studies concerning their use in schools

£10,000 awarded by the National HE STEM Programme

Transferring the magic to STEM

Project lead:

Peter McOwan, School of Electronic Engineering and Computer Science, Queen Mary, University of London

Abstract:

The success of using magic and conjuring tricks as an entertaining and informative method to engage students in learning the fundamentals of STEM subjects was successfully piloted in the More Maths Grads project by, among other efforts, the Manual of Mathematical Magic legacy product. This current application looks to transfer and adopt this curriculum intervention approach beyond maths through the production of a series of downloadable 'Magic of STEM' documents, a supporting website and teaching resources which will allow teachers to perform 'magic tricks' based on cross curricular STEM fundamentals. The easy to perform tricks engage students; trying to work out 'how it's done' invokes students' analytical problem solving; and the reveal that the 'solution' is explained by the underpinning science leaves a lasting impact while also supporting further discussions on how the STEM science so explained underpins the technological 'magic' in the world today. This best practice in maths engagement can, it is believed, be successfully transferred to other STEM subjects.

Deliverables:

- A series of freely downloadable PDF 'Magic of STEM' documents containing tricks, scientific explanations and related careers and research stories, using content pulled from other STEM pilot projects where possible
- A professional 'Magic of STEM' show suitable for a secondary school audience
- A multimedia support website (information, training videos, lesson plans) for the project linked to existing STEM websites
- Development of appropriate teaching resources, following the model of the MMG pilot, to support the project in classrooms
- Dissemination of the project products through HEI networks and through schools networks and the media

£9,970 awarded by the National HE STEM Programme



Constructing a coherent STEM strategy with schools

Project lead:

Alison Hooper, Faculty of Environment and Technology
University of the West of England

Collaborating Institutions:

University of Plymouth

Abstract:

Most universities run STEM enrichment activities with local schools. At UWE we have run activities with respect to mathematics (Maths Challenge, Maths Event Day, FunMaths Roadshows), engineering (Engineering activity day, Bloodhound), science (Science Awareness Day, Hands on Science Day, Bristol Festival of Nature). In contrast, the University of Plymouth run a STEM activity incorporating three STEM subjects (science, engineering and mathematics), in addition to subject specific events. This activity is rolled out to schools in the region throughout June. Both approaches have merit. It is proposed that practice will be shared between the University of Plymouth and UWE through staff visits with the objective of setting up and piloting a Science and Technology Opportunities project as currently run at the University of Plymouth at UWE.

Deliverables:

- Two activity days: one run by Plymouth and a pilot day by UWE based on the University of Plymouth model
- Evaluation by UWE staff of the STOP activity run by Plymouth University
- Evaluation of the pilot STOP activity run by UWE with input from the stakeholder population
- Evaluation by University of Plymouth staff of an existing outreach activity run by UWE
- Dissemination of More Maths Grads resource, Maths in a Box, through STOP activity days

£8,750 awarded by the National HE STEM Programme



Sharing best practice in STEM outreach: How to make friends and influence people!

Project lead:

Karen Moss, Centre for Effective Learning in Science
Nottingham Trent University

Collaborating Institutions:

University of Nottingham; Loughborough University; University of Leicester;
Higher Education Academy Physical Sciences Centre

Abstract:

Universities in the East Midlands have a sustained record of effective collaboration in **HE STEM** outreach based upon activities of the HEFCE pilot projects Chemistry for Our Future, Stimulating Physics, the East Midlands STEM Centres for Excellence in Teaching and Learning (Centre for Effective Learning in Science, Genetics Education Networking for Innovation and Excellence, Physics Innovations Centre for Excellence in Teaching and Learning) and the East Midlands Development Agency funded flagship East Midlands Space Academy programme. Best practice derived from our work through an innovative programme of interactions and development sessions for other Higher Education Institutions, including live sessions with schools and colleges, will be disseminated. A key outcome will be the sharing of our experiences with other STEM subjects and other HEIs, laying the foundations for longer-term **HE STEM** outreach collaboration.

Deliverables:

- Showcase STEM outreach event with multiple HE contributions for a range of age groups from regional schools/colleges
- Structured programme for HE sector on how to design and run activities in a range of STEM disciplines e.g. master classes
- Shared lessons on collaborative working with multiple HEIs, professional bodies and employers
- A set of case studies for the HE sector
- Increased capacity of **HE STEM** sector to organise good quality outreach activities in a wider range of STEM subjects that meet the needs of national widening participation, and effectively promote STEM
- Foundations for future collaborations and networks in STEM outreach
- A staff development model that can be used nationally and in other **HE STEM** spokes to share best practice in outreach

£9,960 awarded by the National HE STEM Programme



E-learning and formative in-course assessment in mathematics and statistics for engineers

Project lead:

W.H.Foster, School of Mathematics and Statistics
Newcastle University

Abstract:

This project will extend the usage of online practice and formative continuous computer-based assessment (CBA) in mathematics and mathematically-based subjects for first year students to the Schools of Engineering at Newcastle University. This is planned to start in the academic year 2010/2011 as an extension to these disciplines of the successful implementation of e-learning and in-course assessment in the School of Maths & Stats at Newcastle University over the past three years using the commercial system I-assess. The project will use a suitably modified practice and assessment cycle as in the School of Maths & Stats. The main activities will be the design and creation of suitable online tests and questions by a domain expert in the relevant engineering schools. Three modules are to be chosen for this first phase: one module in mathematics taken by students from all engineering schools, and two from the Schools of Mechanical and Civil Engineering. The School of Mathematics and Statistics will supply training and advice on authoring questions and tests, together with the necessary infrastructure and access to the CBA system and will initially host the question database for the Schools of Engineering.

Deliverables:

- CBA system for three first year modules (Engineering Mathematics, Mechanics, and Thermofluids) including databases of tests for formative practice and assessment
- Reports on demand specific to the modules enabling timely action and feedback on problems encountered by students
- Reports on questions and tests enabling calibration of levels of difficulty etc.

£10,000 awarded by the National HE STEM Programme

Stimulating student-led employer-focused activity in engineering, chemistry, physics and mathematics at Loughborough

Project lead:

Fiona Lamb and Sarah Bamforth, Engineering Centre for Excellence in Teaching and Learning, Loughborough University

Collaborating Institutions:

Imperial College London; JCB Power Systems; Rolls-Royce plc; Royal Academy of Engineering; Higher Education Academy Engineering Centre; Institute of Mathematics and its Applications; Institute of Physics; Royal Society of Chemistry

Abstract:

Loughborough has a well established institutional ethos of working with employers to develop industry-ready graduates, and much of this interaction is currently delivered within the curriculum. However, Loughborough recognises that students could be further encouraged and supported to combine their academic study with relevant activities above and beyond the assessed components of degrees. For example, students at Imperial College London complete overseas construction projects and organise their own site visits through dynamic student societies. Employers value such activity highly, since it is seen to retain students within STEM, provide students with additional vital relevant work experience and demonstrate the dedication and motivation of these students. This project will form an interested group of students; undertake discovery visits of student-led activity in the UK (starting with Imperial); write up findings; provide funding directly to students to jump-start the best ideas (to be run from October 2010); and provide a case study which will support others to do the same. The project will be run through Loughborough's engCETL, which has an emphasis on links to industry, and involve all 11 STEM related departments at Loughborough. Students will be inspired by the active involvement of senior management, employers and professional bodies and meeting students undertaking such activity elsewhere.

Deliverables:

- A document aimed at students but disseminated widely, covering relevant student-led employer-focused activity
- Evidence based proven practice in student-led activity successfully transferred to and embedded within STEM disciplines at Loughborough University (eleven departments in total)
- More responsibility taken by and active engagement of students with their learning and development of skills needed in the future
- A model of engagement which enables closer and more active engagement with employers and an institutional strategy for long-term implementation of such activity
- UK-wide sharing and dissemination of the project's outputs and outcomes through the case study report and the many stakeholders involved
- Highly motivated and dedicated students inspired by their educational experience at Loughborough who have enhanced employability skills and who go on to be the engineers and scientists that industry needs

£17,000 awarded by the National HE STEM Programme



Stimulating Techniques in Entry-level Mathematics (STEM) with the computer aided System for Teaching and Assessment using a Computer algebra Kernel

Project lead:

Chris Sangwin, Mathematics, Statistics and Operational Research Network
University of Birmingham

Collaborating Institutions:

University of Manchester; Loughborough University; University of Leicester

Abstract:

All STEM subjects share a common core of knowledge and skills in entry level mathematics. This includes numeracy, algebra and linear algebra, trigonometry, geometry and single variable calculus. These topics lie within the core modules C1-C4 of GCE Advanced Level Mathematics, or equivalent qualifications such as the International Baccalaureate. Yet, with the decrease of emphasis on mathematics within the science curriculum, and the modularization of A-level mathematics, there is ever more need to identify weakness in mathematical skills and support students to address any weaknesses. This assessment intervention will link existing computer aided assessment technology with available, tried and tested, practice materials in a way highly targeted to the support needs of an individual student. This will provide tools through which we may help to stimulate the practice of techniques in entry level mathematics.

Deliverables:

- A taxonomy of core skills, each linked to questions in the STACK computer aided assessment system which tests this skill
- Question files for use with the STACK computer aided assessment system. (We anticipate between 30-50 question templates)
- Software extensions to STACK which will automatically generate a user profile and recommendations to students to target their further work, with embedded links to online learning materials
- Working demonstrations on the existing server <http://stack.bham.ac.uk/> which we will maintain for a period of two years after the end of this project
- A workshop session at the MSOR Network conference in September 2010, to disseminate the outcomes of this project

£9,064 awarded by the National HE STEM Programme

Implementation of the University of Manchester School of Chemistry Practical Bootcamp at the University of Nottingham

Project lead:

Jonathan Agger, School of Chemistry
University of Manchester

Collaborating Institutions:

University of Nottingham

Abstract:

The University of Manchester School of Chemistry Practical Bootcamp has run successfully each summer since 2007, under the auspices of Chemistry for Our Future. It provides an invaluable opportunity for students who have been accepted to study chemistry in England to experience a university laboratory environment in the run up to starting their courses. Participant feedback clearly shows a wide variation in practical chemistry experience and confidence in a laboratory environment. The Bootcamp aims to bring all such students up to a similar starting level through the provision of four solid days of experimentation and one day of report writing. There are four different experiments, all based on the hopefully familiar chemistry of aspirin, in the four disciplines of organic, inorganic, physical and analytical chemistry. Students work closely with postgraduate demonstrators and members of staff, are heavily guided in good experimental practice and safe working procedures, and receive detailed feedback on their written reports. Participant feedback has been universally glowing – the Bootcamp has led to a 5–9% increase in year one lab marks. The aim of this current proposal is to disseminate the Bootcamp to the University of Nottingham as a first step towards further dissemination in the future.

Deliverables:

- Bootcamp roll-out pack
- Extensive feedback from The University of Manchester Bootcamp
- 1st and 2nd year undergraduate laboratory marks for Bootcamp participants attending the University of Manchester
- Interim report (after year 1) for HE STEM webpages including assessment of dissemination procedure
- Bootcamp webpage for the University of Nottingham
- Extensive feedback from both Bootcamps in the second year
- 1st and 2nd year undergraduate laboratory marks for Bootcamp participants attending both universities in the second year
- Case study for HE STEM webpages
- Final report for HE STEM and Royal Society of Chemistry hub, to include full analysis of feedback
- Presentation to Widening Participation group within the Universities of Manchester and Nottingham

£10,592.50 awarded by the National HE STEM Programme



Maths Busking: engaging the general public and school groups through the powerful medium of street entertainment!

Project lead:

David Abrahams, School of Mathematics
University of Manchester

Collaborating Institutions:

Royal Institution; University of Bath; University of Coventry

Abstract:

Busking is a form of performance art which must capture and contain its audience from otherwise indifferent members of the public who happen to walk past. As such buskers have developed a range of approaches to draw in and engage a crowd. Maths Busking seeks to learn from buskers and apply these 'busking sensibilities' to mathematics communication. Buskers meet the same disinterested public with whom mathematicians are familiar! Thus the primary focus of Maths Busking is to develop engaging, innately entertaining mathematics routines that will capture the audience whatever their mathematical background. Maths Busking will thus convey genuine mathematical content as the core of the routine, rather than tacked on the end. When people walk away from seeing Maths Busking, they should have a better appreciation of mathematics; feel they have been engaged; and have ways to develop their mathematical curiosity. Another important goal of Maths Busking is to enthuse, train and equip mathematicians (academics, teachers and students). They will then be confident to communicate mathematics in an engaging fashion, both on the street and in the classroom. Maths Busking will focus heavily on training Maths Buskers, so that they will interact with the public long after the event.

Deliverables:

- Broad (geographical, pedagogical and academic) network of trained Buskers with experience of hands-on Maths Busking
- Two performance kits
- Maths Busking tutorial pack
- Website with follow-up resources for the public
- Video and audio output for dissemination, promotion and training

£9,985 awarded by the National HE STEM Programme

SMART: Supporting MATLAB automated assessment to reinforce teaching

Project lead:

Alan Irving, Department of Mathematical Sciences
Liverpool University

Collaborating Institutions:

Loughborough University; Institute of Mathematics and its Applications

Abstract:

The Department of Mathematical Sciences at Liverpool University is setting up a new computational methods module to apply various mathematical methods to problems encountered in engineering analysis using the industry-standard programming environment MATrix LABORatory. There will be approximately 250 students on the module and the department wishes to maintain high teaching standards by setting regular coursework which involves hands-on programming experience and provides regular timely feedback which results in feed-forward (where students learn from their assessment and improve their programming before the next submission). This will be achieved by adopting a system developed at Loughborough University to automate the marking of students' MATLAB scripts and provide individual and timely feedback. To date this has been successfully applied in three Loughborough engineering departments. As MATLAB is the programming tool of choice in industry, taught by many science and engineering departments, the impact of this project could be wide reaching through transfer across the STEM disciplines, to be achieved by thorough documentation of the transfer process; development of an approach to address discipline specific issues; ensuring that the transferred assessment code is easily adaptable; and dissemination through the **HE STEM** Programme and Higher Education Academy Engineering and Mathematics, Statistics and Operational Research Subject Centres.

Deliverables:

- Application of Loughborough University's system of automated MATLAB assessment in engineering to a new computational methods module in mathematics at Liverpool, which will enhance the quality of the students' learning experiences by enabling individual feedback to be given to large cohorts of students in a much shorter time than was previously possible at Liverpool
- Guidelines on setting MATLAB programming coursework that engages students
- Evaluation of student experiences and perceptions after completing the new module
- MATLAB toolkit providing a set of generic tools for the analysis and marking of programming structures within MATLAB which can easily be applied in different universities and disciplines
- Documentation of the transfer process as a case study report on the project so that it can be applied elsewhere
- Feedback to Loughborough on any lessons learned in the application of the system at Liverpool
- Special Interest Group (SIG) through the Higher Education Academy Subject Centres to gather and disseminate expertise across the sector and start to build an interested community
- Dissemination of findings through the Institute of Mathematics and its Applications and Royal Academy of Engineering HE STEM programme partners
- Promotion of the outputs through open educational resource channels (e.g. JorumOpen) to encourage input and feedback from international colleagues

£9,800 awarded by the National HE STEM Programme

Chemistry Practical Skills Podcasts: Videos to enhance the student experience of laboratory classes

Project lead:

Daniel Driscoll, Chemical Sciences
University of Surrey

Collaborating Institutions:

University of York

Abstract:

New undergraduate students often begin their chemistry laboratory classes without a clear understanding of the practical techniques or theory required. This is especially true if the students have had little or no practical chemistry experience during their A level studies and is particularly the case with students taking bioscience programmes, as they may not have studied chemistry at all. Lack of practical techniques and theory is also becoming increasingly common amongst those who have studied chemistry at A level, as many Further Education Institutions are unable to offer adequate practical laboratory classes.

Experience shows that it is often only during final reporting that students start to focus on what the practical learning objectives were, and there is evidence that students will gain more benefit if they are already familiar with the techniques and theory before entering the laboratory.

The aim of the project is to prepare a series of video podcasts (downloadable digital media files) which demonstrate a variety of experiments and common techniques as used in the chemistry laboratory.

Deliverables:

- A series of 5 minute videos, filmed, narrated and subtitled by student demonstrators and suitable for the hard of hearing which show common laboratory techniques and experiments. The videos will be made available to the wider chemistry community
- Evaluation of the impact of the videos on the target audience, presented in a final report

£6,430 awarded by the National HE STEM Programme

Enhancing the impact of chemistry outreach by use of selected, repeated interventions and collaborative university provision

Project lead:

Nigel Lowe, Teaching Fellow
University of York

Collaborating Institutions:

University of Southampton, University of Bristol, University of Bradford

Abstract:

This project will build on the philosophy, methods and experiences of a number of UK chemistry departments to embed activities that will support the development of student laboratory skills before and after embarking on our undergraduate chemistry courses.

This will be achieved by a holistic web/Virtual Learning Environment based approach that makes use of bespoke instructional videos, pre and post laboratory exercises, simulations and virtual experiments. The project will build upon best practice of an existing pilot project and significantly extend it to provide coverage of all areas of introductory practical chemistry.

Funding will principally support the production of course-specific materials through undergraduate summer projects. Additionally, the project will bring together representatives from established projects in Bristol and Southampton. As a result, the project will not only be able to build up an inventory of support materials specific to the University of York, it will also be able to draw directly upon the experiences of established practitioners; making the best use of resources and identifying opportunities to exploit existing resources developed under previous initiatives.

Deliverables:

- Collaborative event, with five London universities and Exscitec, involving student ambassadors
- Evaluation of impact of this event and dissemination of results of this evaluation

£9,250 awarded by the National HE STEM Programme



National **HE STEM** Programme

University of Birmingham
Edgbaston
Birmingham B15 2TT

info@hestem.ac.uk
www.hestem.ac.uk