

Wavelength

Spring 2009

This issue...

In this issue we have a number of articles covering:

- The National Grid Service, or NGS as it is more commonly known, which provides 'free at point of use' access to an extensive distributed computing resource for UK researchers.
- An update on the progress with the reviews of the Student Learning Experience undertaken by the Centre last year. The reports will provide a comprehensive snapshot of the learning experiences of full-time chemistry and physics undergraduates in UK universities in 2008.
- Information about the new Science Diploma. The Diploma aims to provide learning in an applied and work-focused context. In the context of the Science Diploma this means the students will learn about what scientists do as well as about science.
- Resources from development projects. The Centre has now built up a considerable bank of resources arising from nearly 70 projects. These projects cover a wide range of topics from assessment resources, outreach activities, specialist topics such as java applets for physics and a database of inorganic compounds and other resources such as experimental simulations.
- Development project reports from 3 of the projects which recently completed their work; two covering computer based assessment and one looking at ways to support students with Asperger's Syndrome.
- Finally we include some news from the Higher Education Academy; one detailing a seminar series which aims to support access and success for all students; the other looking at a recent survey of academic staff with regard to the rewards within institutions for teaching. ■

The newsletter is free of charge to academics in UK higher education institutions. The material is also published electronically on our web site. Subscriptions are available for those outside the UKHE sector who wish to receive the paper version. Contact the Centre for details.

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If you would like to use NGS resources or have any queries about how your research could benefit from the NGS, then please contact the helpdesk (support@grid-support.ac.uk).

Using the National Grid Service

Would you like to give your students access to resources for 'blue sky' research? Do you need more compute resource for your research? Would you like your research group to take advantage of recent advances in grid computing?

If so have you thought about using the National Grid Service?

The National Grid Service, or NGS as it is more commonly known, provides 'free at point of use' access to an extensive

enquiries through email. Training is available in conjunction with the Training, Outreach and Education team (TOE) at the National e-Science Centre (NeSC).

"Introduction to Grid Computing" courses are run regularly as well as courses for more advanced users. Training events can be organised at your institution on demand for a specific group of users (ie research area) or by level of knowledge. All courses are free of charge to attend. As well as the support services the NGS also provides a database service with a dedicated

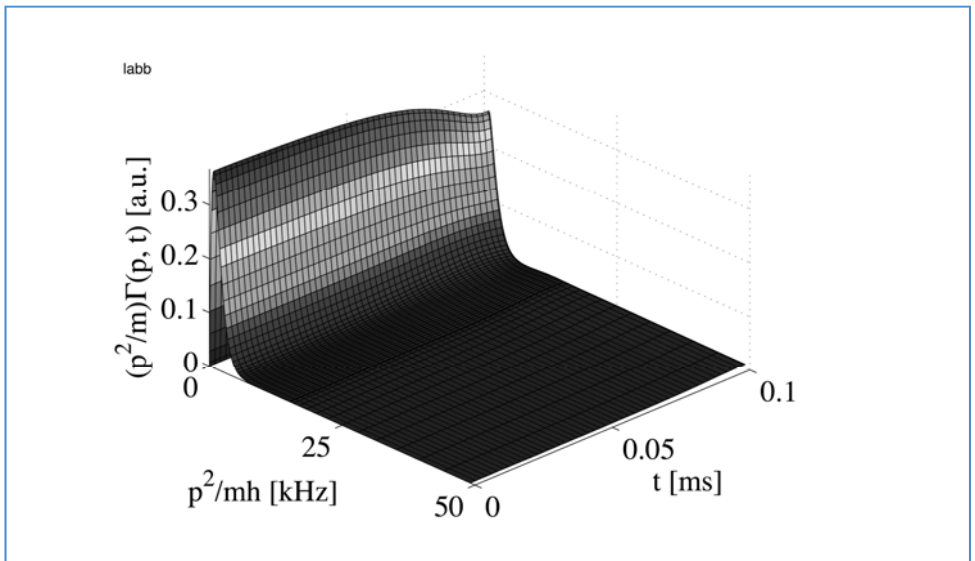


Figure 1: The evolution of the one-body density matrix given by the non-Markovian Boltzmann equation, giving the distribution of atomic kinetic energy as the system evolves

distributed computing resource for UK researchers. This allows access to resources perhaps not available at your own institution such as Condor pools, and can considerably speed up your research in many cases.

Funded by the EPSRC and JISC, the NGS is a distributed service and has 4 core sites at the universities of Leeds, Manchester and Oxford and the STFC Rutherford Appleton Laboratory (RAL). Many other universities are also partner or affiliate sites of the NGS and a full list of the current sites can be found on the NGS website <www.ngs.ac.uk>.

The NGS offers access to large computational resources on which to run jobs but it also offers many support services. Grid computing is new to many people and so the NGS has a robust support network on hand to guide all users – both novices and advanced. A support helpdesk is based at RAL and is staffed by experienced grid technicians who deal with

database team on hand to help you make the most of your data. Supporting both Oracle and MySQL, the database team can help with tuning to improve your database and complete administration of your database. There is a secure back up system as well as data encryption so security of your data is a priority.

Ultracold Gases

Researchers at the University of Oxford have used NGS resources to study the dynamics of ultracold gases, in particular the problem of molecule formation at such low temperatures. Programs have been written to solve a non-Markovian Boltzmann-like equation (NMBE) for the dynamics of ultracold gases and this has been applied to the formation of molecules from cold gases using the variation of a magnetic field. The approach includes the exact time-variation of the interactions, and realistically models the evolution of the atomic gas.

Using the National Grid Service

Large computations are required to model this process for a realistic set of parameters and it has only been made practical through the use of the NGS. The kernel of the NMBE is parallelisable with calculation of the kernel previously taking up to 2 months on a single computer. Accessing resources through the NGS with up to 100 processors at a time has reduced the time taken to less than two days. Using the kernel for dynamics requires 40 hours of processor time but using OpenMP can speed up this computation to a single afternoon.

Ton Hanna, one of the researchers using the NGS at Oxford explained "*The NGS has made a huge difference to my research. I've been able to calculate the kernel for a realistic ramp, and do 15 dynamical simulations. It's shown the method works and so I am working on extending it. It's one of those problems you couldn't think about doing without access to a cluster!*"

Chemistry Databases

The explosion of data produced by chemists since the invention of the periodic table in 1869 requires new methods of dealing with it. The NGS has been working with researchers at the University of Southampton to develop methods of handling this large amount of data.

Chemical data now needs multiple annotations and metadata associated with it to make any real sense to the user. It's not enough anymore to just indicate the boiling point of a liquid as researchers wanting to use that information also require other details such as:

- the pressure the measurement was taken at
- who did the experiment
- when was the experiment performed
- where was the experiment performed.

The provenance of a piece of data is of extreme importance to the end user as they need to be able to trace back from publication to the original data. The need for this information to be stored and easily available to researchers increases the difficulty of maintaining chemical databases. With the areas of computational and combinatorial chemistry pushing the rate at which chemical data is produced, a 'semantic web' approach is being taken by researchers at Southampton.

They have created a Resource Description Framework (RDF) triplestore for chemical data. With the help of expertise from the NGS, they are now looking into whether the use of the Oracle databases can improve the speed of querying. They are also working together to demonstrate the possibility of querying multiple, distributed RDF triplestores. The Oracle RDF triplestore hosted on the NGS is being used along with the RDF triplestore already developed at Southampton. The aim is to be able to dynamically combine data from both triplestores without needing to copy the entire databases over.

The RDF triplestore allows for more complex queries to be run on the data. Its power is in its ability to use triples to represent a relationship between a subject and an object. Relationships between objects and subjects can be explicitly defined or implied by other relationships. Using the RDF triplestore avoids the need for a traditional relational database. These often require long-term design and maintenance that is not an option in the academic world.

The Oracle RDF data management capabilities of high query performance and triple loading capabilities means storing databases with 100 million triples is not a problem. Tools such as Oracle Jena are used for triple loading and storage. ■

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Training events can be organised at your institution on demand for a specific group of users... or by level of knowledge. All courses are free of charge to attend.

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The Student Learning Experience

In 2007 the Higher Education Academy commissioned three Subject Centres in Materials, Microbiology, Biochemistry and Art, Design and Media. Although not part of this pilot scheme the Physical Sciences Centre believed that the time was right to carry out a similar review of the undergraduate experience of teaching and learning in chemistry and in physics. The outcomes of these two reviews will be published in Spring 2009.

The aim of the reviews was to provide a snapshot view of the state of the student experience in UK chemistry and physics departments in 2008. We used online and paper questionnaires to determine the views of undergraduate students and all levels of staff across a wide range of institutions. This information has been supplemented by detailed interviews with Directors of Teaching in several institutions. Although these samples were not statistically significant we are confident that they do represent a cross section of views.

The reports provide a comprehensive snapshot of the learning experiences of full-time chemistry and physics undergraduates in UK universities in 2008. They also provide a rich overview of many aspects of teaching and learning. If there is any surprise in the findings of the studies, it lies in the absence of unexpected revelations about the state of the discipline. The questionnaires and the interviews generally told us what we expected and hoped to hear – that the teaching and learning experience of chemistry and physics undergraduates in the UK is positive and effective. It is not static and is building on a solid basis of educational experience. There is evidence that it is developing through the elaboration of the curriculum, through innovation in approaches to teaching, through the imaginative use of technology, and through the extension of the learning environment, all for the benefit of present and future

students. Students are overwhelmingly satisfied with their experience and perhaps most surprisingly, the nature of the student experience differs very little across different types of institution. The prospects for students entering a physical sciences department in the UK are shown to be sound, and we trust they will continue to improve.

We believe that the review reports will be of value to all those involved in teaching undergraduate chemists and physicists and to those in a position to influence curriculum developments. They should provide useful information to supplement the baseline information obtained from the National Student Survey.

We hope the reports will be of interest to all stakeholders, which we anticipate will include Heads of Physical Sciences Departments, Directors of Teaching, academic staff engaged in teaching chemistry and physics and related disciplines, employers of chemistry and physics graduates, administrators, planners, members of the Royal Society of Chemistry and Institute of Physics, teachers, careers advisors, parents, and current and potential students. We trust that the information that it offers will provide encouragement to all engaged with education in chemistry and physics at HE level, and incentives to develop further what is already clearly seen to be a high quality product.

All the supporting documents – the questionnaires, the Staff and Student Survey Analyses, and the tabulated responses, will be made available through the HEA Physical Sciences Centre website at:

<www.heacademy.ac.uk/physsci/home/projects/subjectreviews>

for anyone who wishes to explore the collected data in depth, and assistance is available from the Centre. ■

The reports provide a comprehensive snapshot of the learning experiences of full-time chemistry and physics undergraduates in UK universities in 2008.

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The new Science Diploma

As part of the 14-19 reform programme, the Department for Children, Schools and Families (DCSF) and the Qualifications and Curriculum Authority (QCA) are developing a new qualification – the Diploma. The last of the new Diplomas will be launched in September 2011 and will include Science.

The Diploma aims to provide learning in an applied and work-focused context. In the context of the Science Diploma this means the students will learn about what scientists do as well as about science. The Diploma will be offered at three levels; Foundation, Higher and Advanced and it is the aim of the Advanced level to provide access to Higher Education.

The structure of the Advanced Diploma is complex and students may take different routes to achieve it. Learning is split between Principal Learning (540 guided learning hours, or glh), generic learning (180 glh) and additional or specialised learning (360 glh). The development of the principal learning is currently underway and a draft 'line of learning' document has been available for widespread consultation. Currently this focuses on three themes which could be broadly identified as chemistry, physics and biology, and overlaps them to cover interdisciplinary areas (fig 1).

The mathematical content of the Diploma may be embedded within the principal learning or be available as a free standing

qualification. The nature of additional and specialised learning, and how much this can draw on existing AS/A levels has not yet been discussed.

The development of the Diploma is being overseen by a Development partnership. The HE Working Group feed into this group. The HE Working Group is trying to ensure that the breadth delivered by the interdisciplinary and applied nature of the qualification is not at the expense of rigour and depth.

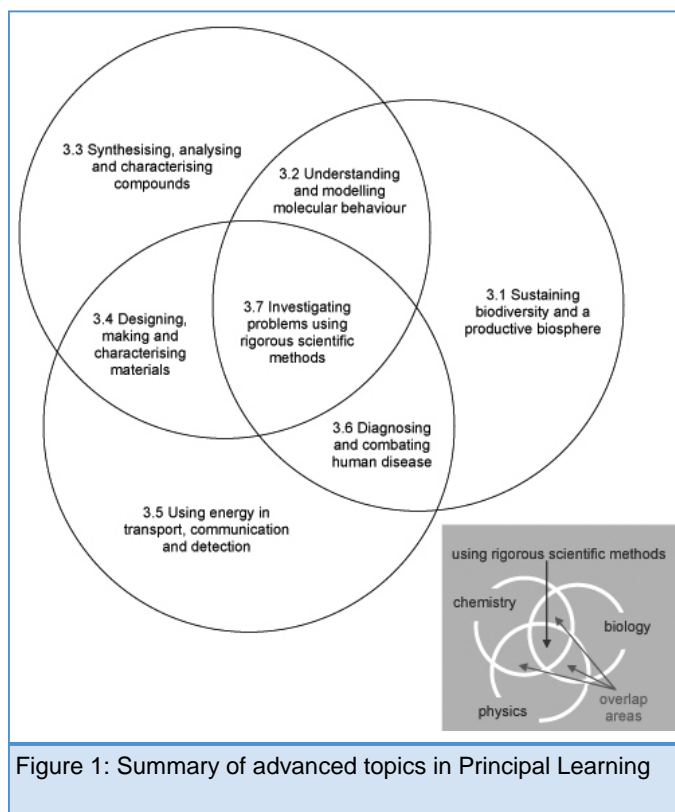


Figure 1: Summary of advanced topics in Principal Learning

For more information see:

<www.sciencediploma.co.uk/#> ■

In... the Science Diploma... the students will learn about what scientists do as well as about science.

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Resources from development projects

The Centre has been providing development project funding for a number of years now and the success of this initiative continues to grow from strength to strength. Each year a call goes out inviting proposals for development projects that support teaching and learning in the physical sciences. Applications are reviewed by an independent panel and each year the Centre can afford to fund about half a dozen projects. Whilst the sums on offer are relatively modest, up to £5k, it is testament to the enthusiasm of colleagues in the community that applications always exceed the funds available.

Projects typically run for one year, starting in September and completing the following year. With an increased focus on being able to record the success and impact of development projects, the Centre has introduced key meetings for development project holders in the last year or so which has proven to be a big hit for all involved. The idea of the meetings is to bring existing project holders together with newly funded projects and this has enabled both current and new projects to share ideas, experiences and tips for their projects with one another. It has been suggested that people considering applying for development project funding could come to one of these development project meetings to find out more about the benefits of applying. This idea is actively being considered and further information will be available shortly, but if you feel you would like to attend a development project meeting then please contact the Centre.

The Centre has now built up a considerable bank of resources arising from nearly 70 projects (example screen shots from 2 projects are shown in figs 1 and 2). These projects cover a wide range of topics from assessment resources, outreach activities, specialist topics such as java applets for physics and a database of inorganic compounds and other resources such as experimental simulations. One recent project titled 'Testing Your Organic Chemistry Knowledge to Reinforce Comprehension and Understanding using Web-Based Multiple Choice Questions' has produced a large number of questions which have proved so versatile that they have been included in the Centre's Question Bank

project, developing a large database of physical sciences questions. Another recent project on inclusion; 'Supporting students with Asperger's syndrome in the physical sciences' is reviewed in another article in this Newsletter.

All projects funded to date can be found on the Centre's website. Here, a summary of the projects are provided as well as the final reports charting the outcomes and also relevant links to any resources which may have been produced. Not all projects

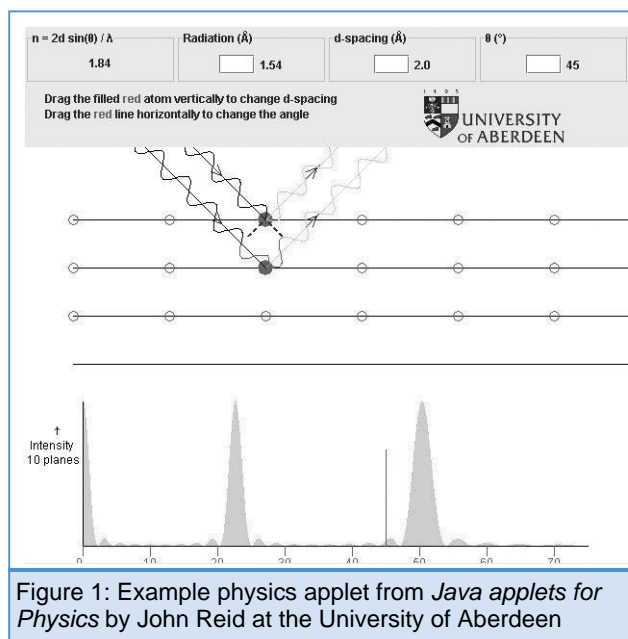


Figure 1: Example physics applet from *Java applets for Physics* by John Reid at the University of Aberdeen

produce resources since the focus of some projects will have been on reporting findings of particular investigations. For example, the 'Bridging the gap' project explores the effectiveness of a strategy for supporting students with diverse chemistry experiences.

One key feature of the outcomes of many development projects is the request from institutions for development project holders to come and talk to their departments about their work. The Centre publicises the work of key development project outputs and project holders are regularly invited to give departmental seminars around the UK. This year alone the Centre had requests for 20 seminars (at 20 different institutions) from 6 projects, demonstrating the high interest in the work produced by the project holders.

Resources from development projects

We are always looking at ways we can improve the dissemination and uptake of resources, findings and other outputs of projects. One stipulation we make for funding is that project holders must make their outputs freely available to the UK Higher Education

community. There is an increasing move that supports this ethos to formalise the availability of resources through a licensing system called open source. Open source licences retain copyright ownership for the author but allows users to take and use the resources for their own teaching purposes. The Centre and a number of consortium members have recently submitted a bid to the JISC/HEA (Joint Information Systems Committee/Higher Education Academy) to make resources publicly available via this route under a funding bid called Open Educational Resources (OER) which will make resources publicly available through open source licences. The Centre will include this approach for future development projects to make future resources publicly available through different outlets – including its existing website. One benefit of this is that the resources will be made available via a range of routes such as JorumOpen (a JISC repository service) and various Web 2.0 technologies such as iTunes U and Flickr, which will be more accessible for end users.

Development projects have proved to be, and continue to be successful due to the enthusiasm and broad ranging ideas funded. Regrettably the limited funding makes selection of projects a difficult choice each year but the Centre fully

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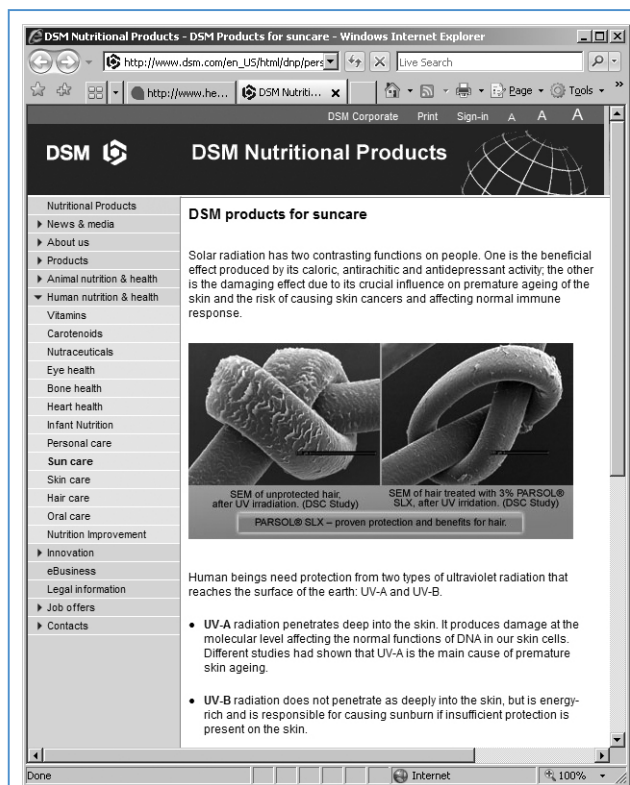


Figure 2: Section of example screen from *Industrially Sponsored Context Based Undergraduate Chemistry Practicals* by Dave McGarvey at Keele University

appreciates the time and effort people put into their proposals and continue to look forward to the next round so that they can fund more exciting and innovative projects. If you would like to apply for funding or are simply interested in finding out more about the resources available then please visit the development project section of our website. ■

One key feature of the outcomes of many... projects is the request from institutions for development project holders to come and talk to their departments about their work.

Development Project Report

DUMP 2.0: From successful development project to sustainable community resource

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DUMP 2.0

This report describes and summarises the achievements and deliverables of the DUMP2.0 development project. This project builds on the outputs of a previously-funded Development Project in 2005-6 (for more details and publications see <www.ph.ed.ac.uk/elearning/projects/dump/> and links therein).

1. Scoping and workplan prioritisation

Work on the project began in the Summer of 2007, with a detailed survey of existing users of the system, in order to ascertain features of the system they had used, found most useful and also to plan and prioritise future development work during this project. The survey was mailed out to all 44 registered users, with 25% responding. The full responses can be found online at:
<www.surveymonkey.com/sr.aspx?sm=K089qq5Ukw0z6Y1dUHdOABS2vSnkzsbwIHCDWfx8 6Dc_3d>.

Probably the most significant part of the survey was to poll the users regarding their requirements for future development plans for the system, the responses to which are summarised in fig 1.

The responses clearly demonstrated that interoperability and a greater range of questions and subject material were user priorities. The ability to submit questions via the system was viewed as less important, and the establishment of community/social networking elements to the site were largely unimportant.

This was then used to prioritise and inform the technical development of the project. The remainder of this report details these technical developments, followed by the addition of a wider range of content types and education level of question. The project benefitted from a close collaboration with the student employed by Physics and Astronomy on their companion Development Project in this area.

2. Technical Developments

The DUMP system now supports a far wider range of different export routes and operates on all 'flavours' of common browsers (automatically detecting the 'best' display properties based on browser capabilities).

Technical developments mean that exporting bundles of questions is now possible in the following formats:

- Self-contained web bundle: This is a ZIP file containing a number of web pages that you can unpack into your own web space, or within a VLE. It contains a number of entry points that you can employ to use your Questions on the web in a number of different ways. This content is completely self-contained and manages all of the question interactions automatically so is a useful option if you want to deliver

16. Please rate how useful you consider the following to be:							
	Not Important (1)	(2)	(3)	(4)	Very Important (5)	Rating Average	Response Count
Ability to export questions into other systems (e.g. QuestionMark Perception, Respondus)	0.0% (0)	0.0% (0)	28.6% (2)	28.6% (2)	42.9% (3)	4.14	7
Support for exporting questions in QTI format	16.7% (1)	16.7% (1)	33.3% (2)	16.7% (1)	16.7% (1)	3.00	6
Support for Mathematics in legacy/alternative formats (e.g. images, ASCIIMath)	33.3% (2)	0.0% (0)	16.7% (1)	33.3% (2)	16.7% (1)	3.00	6
Adding more questions to the bank	0.0% (0)	0.0% (0)	0.0% (0)	57.1% (4)	42.9% (3)	4.43	7
Widening the range of educational levels	0.0% (0)	0.0% (0)	42.9% (3)	42.9% (3)	14.3% (1)	3.71	7
Widening the range of difficulties	0.0% (0)	0.0% (0)	42.9% (3)	14.3% (1)	42.9% (3)	4.00	7
Widening the range of subjects covered by the bank	0.0% (0)	14.3% (1)	0.0% (0)	28.6% (2)	57.1% (4)	4.29	7
Allowing users to create, submit and share questions	0.0% (0)	0.0% (0)	42.9% (3)	28.6% (2)	28.6% (2)	3.86	7
Building community/social networking aspects to the site (e.g. ratings, links to public user profiles, discussion groups etc.)	42.9% (3)	28.6% (2)	0.0% (0)	28.6% (2)	0.0% (0)	2.14	7

Figure 1: User requirements for future development plans

some formative assessment questions but don't have any kind of assessment engine available. The web content uses MathML for displaying mathematics in browsers which support this, automatically falling back to 'maths as images' for other browsers as necessary.

- Printed PDF Format: This is a simple PDF listing of your questions, with options to have the correct answer highlighted and to show the feedback for each answer. There are also some

DUMP 2.0

limited customisation options available (eg title of questions, numbering scheme etc).

- QTI 2.1: We now support exporting a bundle of Questions in the latest (draft) version of the Question and Test Interoperability (QTI) specification. Each Question is exported as a separate QTI document and bundled up as an IMS Content Package (v1.1.3). Options exist for including Mathematics as either (really nice) MathML, (quite nice) transparent PNG or (not at all nice) opaque GIF images, and feedback can be included or excluded as required. We decided to support multiple graphic formats in the event that the questions are used in web-based systems on older versions of Microsoft Internet Explorer, which needs a 'hack' to support transparent PNGs that may not be feasible in some assessment engines. We can also output the slightly older QTI 2.0 specification as well.
- QTI 1.2: We also support exporting a bundle of Questions in this older (but still very popular) version of QTI. Again, each Question is exported as a separate QTI document and bundled up as an IMS Content Package. QTI 1.2 does not support MathML so all mathematics is converted to images (either transparent PNG or opaque GIF) on export.
- Respondus Import: it is now possible to export questions in a ZIP file that can be subsequently imported into Respondus. Beneath the hood, this is just a modified version of the QTI 1.2 export but includes a number of tweaks required for Respondus to handle it correctly. Once into Respondus, it is then easy to import the questions into other systems, such as WebCT, Blackboard etc, making it possible to use these questions for summative assessment with most popular VLE systems. Motivated by our own our institution's consideration of its next

VLE system, we have also implemented interoperability with Moodle and Sakai.

- All existing questions (c 500) in DUMP have now been passed to Dick Bacon in a suitable format for import into the Physical Sciences Centre Question Bank system.

3. Content development

In collaboration with the St Andrews Development Project, the DUMP system has been used to author 200-300 new resources in the areas of quantum mechanics, electromagnetism, astronomy and astrophysics. All of these resources are once again provided for import into the HEA PSC Question Bank.

To accommodate a wider range of subject material, content and education level, we have implemented several modifications to the way that users of the system can 'discover' and choose questions, including:

- Support for (and search filtering) by educational level.
- Ability for users to 'tag' questions with their own keywords, rather than being fixed to a given taxonomy of keywords.

The final area of development is the creation of a content editing interface, which will provide the facility for users to create their own questions, either from scratch or by copying an existing question. This is currently undergoing final development (having been somewhat delayed due to staff absence as a result of sickness) but will be included in a future release of the system. ■

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Development Project Report

Development of learning material for formative computer based assessment in physics and astronomy

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(Note: see report on p8 of this newsletter for more information about the DUMP project.)

Computer based assessment

This final report is divided into two parts: the first part details the project outputs by giving details of questions put into the DUMP and Centre's question banks, the second part is a guide to using questions to enhance physics teaching and learning.

In this project, we had aimed to create 300 questions covering a variety of physics and astronomy topics over a range of educational levels. Table 1 shows the modules and UK educational levels where questions were developed, giving the number of questions for each of the

There are a small number (32) of numeric entry and ranking questions. As these question types are not supported by DUMP and by several virtual learning environment (VLE) targets in the Centre's (PSC) Question Bank, we have wherever possible created a multiple choice/multiple selection version of these questions and included them in DUMP and in PSC format. Each question is only counted once in Table 1; ie, the same question as a ranking question and a multiple choice question, with two versions of feedback (see below) is counted as a single question.

Table 1: shows the modules and UK educational levels where questions were developed

Module or Course	UK educational level	Total number of questions
Stars and Elementary Astrophysics	7	13
Solar System	7	24
Waves and Optics	7	10
Properties of Matter	7	10
Thermal Physics	8	23
Special Relativity	8	8
Oscillations	8	32
Electricity and Magnetism	8	48
Quantum Mechanics I	9	50
Quantum Mechanics II	9	14
Nuclear and Particle Physics	10	87
	Total:	319

modules. From the table, one can see that the aims of the project have been achieved. 319 questions in total have been created in a wide range of physics and astronomy areas, with 57 (18%) questions in 1st year (UK educational level 7), 111 (35%) in 2nd year (level 8), 64 (20%) in 3rd year (level 9) and 87 (27%) in 4th year (level 10). There are 282 (88%) physics and 37 (12%) astronomy questions.

The large majority of the questions are multiple choice or multiple selection. This reflects the fact that a substantial fraction of the questions were developed to be used in lectures with electronic voting systems as well as the fact that multiple choice/multiple selection questions are supported by all assessment system platforms.

We have put much effort into creating useful feedback for each question. All questions have feedback, many of them have individual feedback for each possible response. Table 2 shows the questions split by difficulty and by domain. The domain follows Bloom's taxonomy, whereby "analysis", "synthesis" and "evaluation" are incorporated into "application". While the divisions of difficulty and domain are debatable (depending on prior knowledge, the same question can be simple or difficult, and the divisions between knowledge, comprehension and application are not always well defined), Table 2 shows that most questions focus on higher-order cognitive skills, and the fraction of simple questions is quite small. Physics is a visual subject, in which images and graphs can

Computer based assessment

substantially enhance the quality of questions. A substantial fraction of the questions (96 questions, 30%) contain images or graphs that were created as part of the project.

feedback for all questions both for the formative and summative quiz. This scheme aims to give students an incentive to do the formative quizzes and to read the feedback carefully prior to the summative

Table 2: shows the questions split by difficulty and by domain.

Domain/ Difficulty	simple	intermediate	difficult	totals
knowledge	16	5	0	21
comprehension	23	79	1	103
application	38	142	15	195
totals	77	226	16	319

All questions have been scrutinised at St Andrews after editing prior to submission to the PSC and DUMP question banks. In order to ensure the usefulness of questions for a large variety of platforms, the questions in the PSC question bank have been created to be compatible with WebCT. This implies that feedback contains no complicated formulas, uncommon symbols such as \hbar and no images. Where these features would enhance the feedback, we have created a second version of the question that is now in the DUMP question bank. In the future, it is foreseen that questions will be in QTI2 format in the PSC question bank. When this is the case, the enhanced versions of the questions in DUMP will be incorporated into the PSC question bank.

We plan to use the PSC question bank to enhance our teaching in the upcoming academic year. As one example, we have modified the assessment of the nuclear and particle physics module so that 5% of the final mark will be awarded for weekly multiple choice quizzes incorporated into WebCT. Each week, students first complete a formative quiz and are given feedback. They then complete a quiz with similar questions which is summatively assessed. Students are given automated

quiz, as well as giving them formative feedback on their progress each week. As student performance statistics are available, it is possible to close the loop by discussing questions with poor results in the lectures, and offering students to contact the lecturer if they do not understand the automated feedback. As each question has one or more correct answers, it is not possible for students to get a good mark by random guessing, in particular if negative points are awarded for incorrect answers. Students are allowed to use notes and textbooks, and the low stakes involved aim to avoid problems with system abuse.

We are very grateful to David McKain at the University of Edinburgh and Dick Bacon at the University of Surrey for their excellent support in helping us to include our questions in the DUMP and PSC question banks. We used their editors to input our questions. Martin Kennedy was an outstanding summer student, without whose efforts this project would not have been completed. We particularly thank the Higher Education Academy for their financial support of this project, and for the many helpful comments at development project meetings in the course of this project. ■

In this project, we had aimed to create 300 questions covering a variety of physics and astronomy topics over a range of educational levels.

Students are given automated feedback for all questions both for the formative and summative quiz.

Students with Asperger's Syndrome

Development Project Report

Supporting Students with Asperger's Syndrome in the Physical Sciences

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"Our aim is to enable students to reach their full potential." It sounds a bit clichéd, but for an intelligent, academically capable student with Asperger's Syndrome, getting the degree that genuinely befits their true intellectual capabilities can seem like an up-hill struggle. Asperger's Syndrome (AS) is a condition on the autistic spectrum characterised by difficulties with flexibility of thought, social interaction and communication. People with AS may find it difficult to empathise or to know what others are thinking, finding other people unpredictable and confusing. They are likely to experience difficulties functioning in 'our world', which relies heavily on non-verbal communication and the unwritten rules which guide our behaviour. Life can be hard for people with AS; it affects every

that we were not in fact re-inventing, but rather inventing the wheel. This eventually developed into a desire to find out what support students with AS are actually getting in the physical sciences in the UK, indeed how much do staff know about Asperger's Syndrome?

The initial phase of project involved surveying UK physical science departments to find out how many students with AS they had, what they knew about the condition and what support was available. It soon became clear from the responses that many departments were very keen to get more information about how best to support their students with AS. As a result of the desire to improve the situation of students with AS, and the staff supporting them, we have produced a

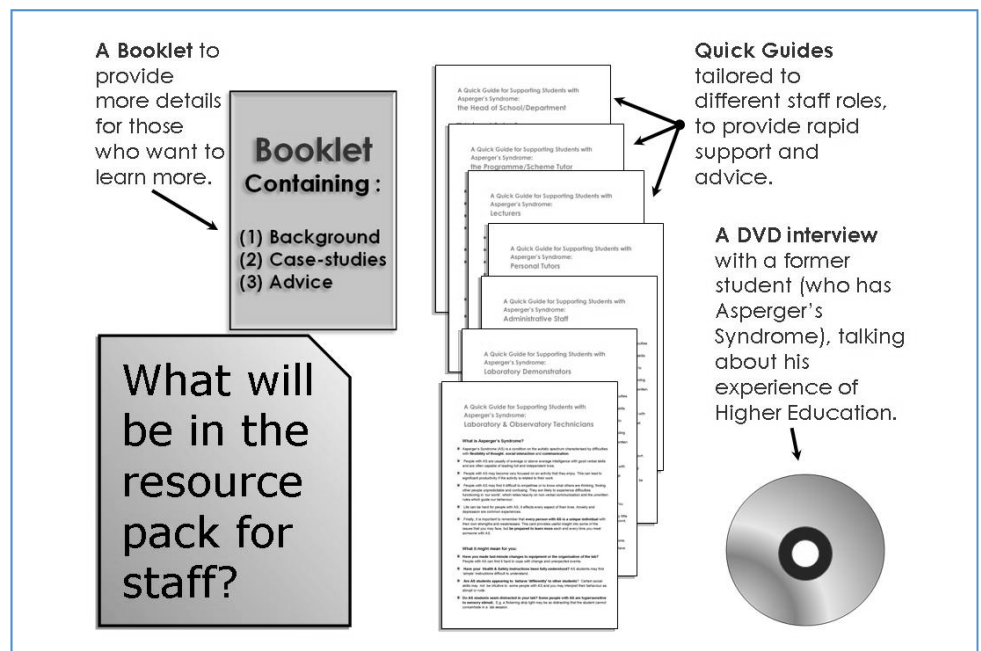


Figure 1: The elements of the Resource Pack

aspect of their lives. Anxiety and depression are common experiences. Yet people with AS may also become very focused on an activity that they enjoy. This can lead to significant productivity if the activity is related to their studies.

A Resource Pack to help Staff Support Students with AS.

This project grew from a chance conversation. After struggling to find the best support strategy for a particular student with AS, one of the authors asked the student's mother what information was out there to avoid us having to 're-invent the wheel'. The student's mother replied

resource pack suitable for physical science departments (see fig1). Its aim is to provide the academic who has little or no experience of AS, with a helping hand. It should not be taken as the final answer, and indeed we hope that one day someone will see fit to expand, revise and replace the pack with a more up-to-date and comprehensive version.

What is in the Resource Pack?

This project was principally developed by 2 physical science academics (Hughes & McCall) and 2 disability professionals (Milne & Pepper). The resource pack is designed to be flexible so that each

Students with Asperger's Syndrome

department can use the various components in a way that best fits their staff/student support strategy.

The 3 components of the pack are:

1. **A booklet that contains background information, typical scenarios you might encounter and advice to help you support students with AS.** The booklet is designed to be a 'dip in' resource so that you can jump to the section that interests you.
2. **A set of Quick Guides tailored to individual roles** within a typical physical science department (Head of department, lecturer, tutor, lab demonstrator, admin staff etc).

The Quick Guide for each staff role has 3 sections:

- What is Asperger's Syndrome.
- What it might mean for you.
- What you can do to support students with AS.

These easy-to-read guides can be distributed to staff in your department to increase awareness about AS, and provide useful guidance as quickly as possible.

3. **A DVD containing an interview with a former successful physical science student** (who has AS) and his mother. An edited version of the interview on the DVD (~15 min) should be short enough to show in a typical staff meeting. The interview explores the impact that AS had on the student's experience of university, covering core topics such as lectures, labs, registration, exams, etc. The DVD is designed to provide a personal window into the experience of one particular student with Asperger's Syndrome, and should provide useful background to staff members with little knowledge of the condition.

The text part of the pack will be available in both print form and pdf, and you will be able to order additional components to distribute within your department.

Our resource pack is designed to help members of a typical physical science department, who may know little about Asperger's Syndrome, to provide the best opportunities they can for their students with AS. We don't claim to have all the answers, and undoubtedly new ideas will emerge about best practice. But we hope that this resource pack will provide a starting point, to enable academics to help students with AS achieve the degree that genuinely benefits their intellectual capabilities, rather than one that simply reflects the difficulties faced by their condition. ■

The... pack is designed to be flexible so that each department can use the... components in a way that best fits their staff/student support strategy.

Our resource pack is designed to help members of a typical... department, who may know little about Asperger's Syndrome, to provide the best opportunities... for their students...

News from the Higher Education Academy,
adapted from:

<www.heacademy.ac.uk/news/current>

Access and Success for All

Higher Education Academy launches Research Seminar Series 2009

The Higher Education Academy has now begun its UK-wide 2009 Research Seminar Series entitled "Access and Success for All".

This second series, offered by the Academy in association with the Action on Access and Equality Challenge Unit, builds on the success of the first seminar series delivered in 2007-8 as part of the work of the Disability Equality Partnership.

Dr Helen May, Senior Adviser at the Academy, said: "The series aims to support access and success for all students through two main ways; either by disseminating research and evidence which an institution has undertaken, or using research to inform practice, and most of the seminars in this series fulfil both roles."

The seminars are hosted by 19 institutions across the UK, covering four inter-related strands this year:

- inclusive practices to promote equality for disabled students
- effective approaches to widening access
- enhancing student retention and/or success
- improving the degree attainment of students from Black and minority ethnic groups.

As a requirement of participation, host institutions will produce a briefing paper which will be made available through the Academy's widening participation research service (WPRS). This service offers support to all staff in higher education with a widening participation or inclusion remit and provides access to research information, services and resources to support success throughout the student lifecycle.

Mike Wray, Senior Policy Adviser from Action on Access, said: "This series is an excellent opportunity for staff in higher education institutions to share their experiences and benefit from extensive work already undertaken in this area."

Dr Sue Cavanagh, Head of Policy and Programming at Equality Challenge Unit, added: "Last year's seminar series was a great success in highlighting and sharing inclusive practice for disabled students and the themes investigated in the upcoming seminars promise to continue to support institutions as they further develop their plans to meet the needs of an increasingly diverse student population."

Dr May continued: "By ensuring the presentations and briefing papers from each seminar are posted on WPRS, we can reach an increased number of people who have an interest in promoting the access and success of all students, which will be of great benefit to students throughout the UK."

Places at each seminar are limited and are allocated on a first come, first served basis. There is no charge for places. A full list of the seminars, along with booking details, can be found at:

<www.heacademy.ac.uk/ourwork/learning/national_research_seminar>

on the Academy's web site. ■

The series aims to support access and success for all students...

News from the Higher Education Academy,
adapted from:

www.heacademy.ac.uk/news/current

Rewards for Teaching

Teaching should be important in promotions, say majority of HE staff

Major new research published by the Higher Education Academy shows that academic staff feel that teaching in higher education is not properly rewarded.

Over 90% of academic staff surveyed by the Higher Education Academy think that teaching should be important in promotions, but only a minority of staff think that it actually is.

This interim report is the first of two from a collaborative project by the Higher Education Academy and GENIE (a Centre for Excellence in Teaching and Learning in Genetics) at the University of Leicester, looking at teaching in higher education. This first report focuses on academic staff perceptions of and experiences about the reward and recognition of teaching. The final report, to be published later in the year, will include the results of a study into higher education institutions' policies for recognising teaching, and how these policies are being implemented.

Key findings from the survey of staff conducted for the research include:

- Over 90% of academic staff think that teaching should be important in promotions
- Most academics feel that the status of teaching is low in comparison with research. They also say that research is important, and that it is by and large given appropriate status and suitable emphasis in appointments and promotions
- Academics in more research-focused universities are less likely to be satisfied with the importance their institution attaches to teaching in promotion decisions

- There are differences in perceptions of the importance of teaching in promotions by type of appointment - the more junior the staff member the more likely they are to say that it is not important in promotions. Staff who are in senior posts are less likely to think that there is a sizeable difference between ideal and actual in the importance of teaching for promotion
- Training and support are valued as ways of raising the status of teaching.

Professor Paul Ramsden, Chief Executive of the Higher Education Academy comments:

"High quality teaching makes an enormous difference to students. This research is an important part of the Academy's work to raise the status of teaching. From these findings we can see that teaching in UK higher education is still perceived by academics to be valued and rewarded too little, both in formal personnel processes and in the dominant culture of institutions".

Read the Reward and recognition of teaching in higher education report at:

www.heacademy.ac.uk/ourwork/research/rewardandrecog

on the Academy's web site. ■

Over 90% of academic staff surveyed... think that teaching should be important in promotions, but only a minority of staff think that it actually is.

Work Higher Project

The Centre is pleased to announce that we have been successful in a bid to HEFCE for an Employer engagement project called 'Work Higher'. The funding is awarded for a collaborative venture between the Centre, Cogent Sector Skills Council and the University of Hull.

The aim of the project is to develop a suite of Foundation Degrees for the Nuclear, Polymer, Petroleum, Chemical, Pharmaceutical and Bioscience industries. Cogent and SEMTA Sector Skills Councils have identified higher level skills gaps in these sectors which could be filled by work force development through this framework of flexible Foundation Degrees.

The Foundation Degrees will be delivered by a consortium of HEIs and would attract co-funded Additional Student Numbers.

The development of the new programmes will be supported by secondment of academic staff in each HEI and secondment of Industry Champions from each of the sectors who will provide specialised input. This three year programme commences in April 2009.

One of the first responsibilities for the project team will be to identify the partner HEIs. Opportunities to be involved as a consortium member will be advertised soon. Anyone interested in being involved with the project further should contact the Centre.

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The Physical Sciences Centre is funded by the Higher Education Academy (www.heacademy.ac.uk) and is part of the Academy's Subject Network. The Centre is supported by the Universities of Hull, Liverpool and Surrey.

Offers to contribute to the newsletter are welcomed. Please contact the Centre.

Publications Update

Currently the Centre is active in updating a number of our publications; ie:

Briefing papers

designed to provide a condensed discussion on issues and topics related to teaching and learning in the physical sciences.

Primers

designed to provide practical advice and guidance on aspects of teaching and learning in the physical sciences.

Toolkits

bring together and provide links to reports, information, resources and downloads for a particular topic.

These are being updated by the Centre to ensure the currency of the information contained within them and in some cases they are being withdrawn or replaced as they are no longer applicable.

At the same time we are redesigning the layout, within our overall design schema, to ensure that each in a publication set is readily recognisable as a part of that series but that each is distinct from others in the same series.

The new versions will be published initially on our web site as Acrobat files and some will also be distributed through the normal mailing system. ■

Events —2009—

- Development Projects Meeting, 29th April, York
- Departmental Representatives Meeting, 12/13th May, Warwick
- E/PBL Workshop, 20th May, Leicester
- Follow up workshop for New and Aspiring Lecturers, 10th June, York
- Lowering the Drawbridges: Legal & Forensic Science Education for the 21st Century, 27th May, Leeds
- Science, Learning and Teaching Conference, 16/17th June, Heriot Watt University
- FORREST, 30th June/1st July, Liverpool
- GIREP-EPEC and PHEC, 17th/21st August, Leicester
- Variety in Chemistry Education 2009 and Eurovariety 2009, 2/3/4th September, Manchester

Contact us or visit our
web site for details.