ltsn Supporting Learning and Teaching

Physical Sciences

Volume 1, Issue 2

September 2000

ISSN 1470-3882

LTSN Physical Sciences News

...supporting learning and teaching in chemistry, physics and astronomy

Special points of interest:

- LTSN is the Learning and Teaching Support Network. There are 24 Centre's covering most of the academic disciplines taught at university level.
- LTSN Physical Sciences is guided by an Advisory Committee, comprising academics from physical sciences and members of the relevant learned societies. The Centre also has a Management Committee comprising the Centre staff.

In this issue:

National Launch of LTSN Physical Sciences

The LTSN Physical Sciences Centre was formally *launched* at the Royal Society, Carlton House Terrace, London on Friday 30th June 2000.

The launch was intended to provide an opportunity for those involved in teaching and learning in the physical sciences to find out who we are and what we plan to do and to allow those attending the chance to help formulate the Centre's plans for the future. Nearly one hundred academics attended.

The session started with a talk from Cliff Allan, the LTSN Programme Director who gave an overview of the LTSN programme as a whole. This was followed by an introduction to the LTSN Physical Sciences Centre by Tina Overton, Director of the Centre and a more detailed look at *e*-resources and C&IT support by Roger Gladwin, Centre Co-ordinator.

After lunch there was an opportunity for those attending to tell the Centre staff what they thought the Centre should be prioritising for the future. Six group discussions were organised, chaired by members of the Centre's Advisory Committee and the results fed back to the whole meeting at a closing plenary session.

In addition all participants were asked to complete a survey form asking for details of the current teaching and learning activities within their departments.

The Launch. A session from the group discussions

Priorities highlighted included help with practical work, the problem of poor mathematics skills, dealing with assessment loads, ensuring success with industrial placements, creation of resources for teaching key skills and use of web-based resources.

The Centre will be developing responses to these concerns over the coming months, particularly in its workshop programme.

Re-launch of the Centre's web site

In July the Centre's web site was re-launched with a new design and additional content. The design is intended to allow for easy navigation, with a minimum of clicks required to find information and with a minimum of scrolling once information is found.

The address for the web site remains

http://www.physsci.ltsn.ac.uk

New areas include teaching and learning resources and on-line versions of centre publications. Coming soon are reviews of books, software and web sites. The new content has been added as a database which allows for a more dynamic presentation of information. This facilitates searching for relevant information (eg a user looking for astronomy content is not presented with information about organic chemistry).

Over time we will be adding more content and refining the existing information. Please be patient as we develop this resource.

ASTER and Small Group Teaching in the Physical Sciences

ASTER is a TLTP3 project exploring how Communication and Information Technologies (C&IT) can assist students and lecturers in making the most effective use of small group learning and teaching. The project partners are the Universities of York (leading partner), Oxford and Surrey, and University College Northampton.

Project Background

ASTER stands for Assisting Small group Teaching through Electronic Resources. The term small group, though widely used, is open to a number of interpretations. For ASTER, small group teaching refers to a teaching-learning situation in which the students interact with each other and a tutor, engage in dialogue for analysis, reflection or critical thinking, and which results in collaborative learning. The importance of small group teaching is recognised throughout Higher Education, but resourcing changes have often resulted in reduced opportunities for traditional small group situations within mainstream courses. Both institutions and individuals are naturally concerned that the very best use should be made of those that remain. Electronic resources are frequently proposed as a supporting tool. Without adequate information on the available options and considered reflection on the desired changes and possible outcomes, however, their introduction can be ineffective and unsuccessful. ASTER seeks to promote and support effective educational innovation by establishing, validating and disseminating a corpus of current good practice and expertise on the use of C&IT for small group teaching.

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The initial phase of the project sought to identify the current use of C&IT in the disciplines of the partners, i.e., Physics, Psychology and subjects from the Humanities. It investigated which existing technologies were being adopted for small groups, which new ones were being developed and the reasons for their introduction. The findings from these studies are summarised in ASTER's on-line bibliography and first newsletter.

The 41 lecturers interviewed for the initial survey presented mainly pragmatic reasons for introducing C&IT. These included dealing with increased student numbers, providing better resources, keeping students on-task, giving quicker feedback, facilitating discussion, increasing student involvement, improving contact time and making courses more interesting. Examples of use of C&IT included on-line lectures and course notes, course homepages with links to related material, electronic documents created by past and present students, e-mail/bulletin and discussion boards, analysis software, bibliographic databases, data sources, tutorial and simulation packages and automated assessments. An interesting spin-off of this phase was the comparison of C&IT uses across the different disciplines. In the Humanities and Psychology, communication tools and use of the Web were dominant, while in Physics computers were reported as supporting the demonstration of practical techniques and providing opportunities for understanding and exploration through simulations, worksheets and software. Goals of teaching transferable skills (group work, collaboration, presentation/ oral and IT skills, information retrieval and data handling) were common to all disciplines. Though the sample of lecturers in this survey was too small to allow statistically reliable conclusions to be drawn, it appears that the variety of electronic tools results from the variety of approaches to small group teaching, which, in turn, are determined by the nature of the knowledge and skills that the different disciplines expect students to acquire.

The second phase of the project has concentrated on collecting case studies by interviewing lecturers who use C&IT to support small group teaching. The compilation, comparison and interpretation of the results are currently in progress and a report will shortly be available on the ASTER web site.

Case Studies

The following is a preliminary synopsis of the findings in the Physical Sciences. The case studies in this area were conducted by the Physics partners in the project, at the University of Surrey. Eleven lecturers in seven universities were interviewed, selected by their responses to a request for participation in this study of the use of C&IT in small group teaching. The modules comprised Physics (3), Chemistry (2), Mathematics (2), Astronomy (1), computing languages (2) and presentation skills (1). Two of the courses were for students of Engineering. The majority of the modules were for first year students, with two instances each of final year and MSc courses.

The reasons given for introducing C&IT were similar to those reported in the first phase of the project, namely to provide improved resources, to increase student motivation, to facilitate understanding, to

make courses more interesting, to enable students to work with current data and use state of the art techniques (as they will be using in a professional situation), to allow students to better pace their studies and to save staff time. One issue that arose in three case studies was the decline in the mathematical skills of first year students. Their poor numerical competence prompted the introduction of remedial worksheets in one instance and the development of software programs to provide extra practice in certain types of problems in the other two.

The electronic resources found in these studies included simulations, tutorial software, Web dissemination, learning environments, automated assessments and analytical and presentation tools. The majority had been prepared for particular courses and therefore their transferability was limited to similar modules. For instance, the electronics simulation package *Spiceage* mainly used by first year Electrical Engineering students was also useful to their third year colleagues for project work. Usage of the Web was only cited in three cases: to post tutorial questions in Mathematics for Engineers, to provide on-line course notes in a Fortran course and both to give examples related to tutorial work and to launch the simulation software in a Waves and Optics module. The three Physics modules all used simulations: *Spiceage*, *Psst!* (a numerical optical amplification simulation) and the Waves and Optics elements of *CUPS[1]* and *Albert[2]*. The courses teaching the computing languages C and Fortran made use of learning environments. Tutorial software had been developed for the Astronomy, Chemistry and Mathematics modules, and automatic summative assessments were used in Chemistry and C programming. Most of the tools provided formative feedback to the students in the form of corrections or further information. Commercial software included *Spiceage*, *CUPS* and *Albert* (Physics), *Mathcad[3]* (Mathematics), *CLEA[4]* (Astronomy) and the presentation tools *Powerpoint*, *Toolbook[5]* and *Frontpage*. *CUPS*, *Albert* and *CLEA* had had supplementary programs written in-house. Only the *Ceilidh* system for C programming and *Psst!* had been developed under grants (TLTP and SHEFC respectively). The Chemistry programs and the learning environment for Fortran had been produced entirely by the departments where they were being used.

The contribution to each module from the C&IT component varied enormously. In three cases (the computing language modules and the third year Mathematics for Physics course), the software was an intrinsic part of the module, which would have had a completely different format without it. This was particularly evident in the Mathematics module, which was set up entirely based on the software package *Mathcad*. By contrast, the remedial exercises of Mathematics for Engineers and the practice part of the automated Chemistry assessment were provided for the students' benefit as extra material and were not compulsory. Both were intended to be used totally in the students' own time. Otherwise the software was, to different extents, integrated into the tutorials and laboratory sessions. In some instances, access outside class time was also possible and encouraged.

Only the introduction of *Mathcad* resulted directly from a departmental policy decision. In all other cases, while the departments were reported as generally "encouraging the use of IT for teaching", it was the interest and commitment of the individual lecturers that led to the use of the computer aided components in the courses. This was done without financial support, or time allowances, from the respective universities.

Future Work

In the final phase, ASTER will provide support tools that will encourage lecturers to reflect and make informed choices on how they can use C&IT to improve small group activities and on which approaches will be most productive in their circumstances. The tools will reflect the variety of purposes of small group teaching and the variety of forms small group teaching can take. The dissemination of the results will be carried out through workshops, on-line information and publications. ASTER also seeks to have its outcomes embedded into accredited training, and will endeavour to optimise possibilities for a continuing support centre.

References

1. CUPS (The Consortium for Upper-Level Physics Software), published by John Wiley and Sons, Ltd.
2. Albert Complete Physics, published by ChessBase Gmbh.
3. Mathcad published by Adept Scientific plc.
4. CLEA (Contemporary Laboratory Experiences in Astronomy), published by Dep. of Physics, Gettysburg College.
5. Toolbook, published by Asymetrix Learning Systems Ltd.

Report by…
Lena Tostevin and Dick Bacon
Department of Physics
University of Surrey

"ASTER will provide support tools that will encourage lecturers to reflect and make informed choices on how they can use C&IT to improve small group activities and on which approaches will be most productive in their circumstances."

For more information, visit the ASTER web site: *http://cti-psy.york.ac.uk/aster*

LTSN Physical Sciences

Department of Chemistry
University of Hull
Hull HU6 7RX

Director:
Dr Tina Overton
Phone: 01482 465453
Administrator:
Mrs Jean Quantrill
Phone: 01482 465418

Fax: 01482 466410
Email: ltsn-psc@hull.ac.uk
Web: www.physsci.ltsn.ac.uk

Events

- Postgraduate Skills Record Workshop, 24th Oct 2000, Surrey (RSC event).
- New Directions in Problem Solving, 25th Oct 2000, Manchester.
- A Mathematics Toolkit for Scientists, 8th Nov 2000, Birmingham.
- Postgraduate Skills Record Workshop, 16th Nov 2000, Manchester (RSC event).
- Promoting Effective Learning in the Chemistry Laboratory, 22nd Nov 2000, Leeds.
- Promoting Effective Learning in the Physics Laboratory, 22nd Nov 2000, Warwick.
- Teaching Elementary Mechanics using SToMP, 6th Dec 2000, Surrey.
- Web Authoring for Beginners, 17th Jan 2001, Hull.

Contact us or visit our web site for details.

Development projects

The Centre has a limited amount of money to support academics wishing to develop and disseminate good, innovative teaching practices or to improve the quality of learning, teaching or assessment in the physical sciences. Following an e-mail broadcast to the community, fourteen proposals were received by the Centre. A selection process involving the Advisory and Management Committees then narrowed the list down to the following successful applications . These projects should start in the Autumn.

Undergraduate Understanding of the Practices of Physics

Dr Jim Ryder and Dr Ashley Clarke, University of Leeds

Teaching Physics in an Internet Journal Group Project

Dr Derek Raine, University of Leicester

Utilising On-line Learning

Dr Michael Cole, Manchester Metropolitan University

The Development of 'Exploring Errors' Software

Dr Andrew Horn and Jane Tomlinson, University of York

Creating a Central Role for On-line Experiments in the Undergraduate Science Course

Dr Hugh Cartwright, University of Oxford

Look out for the call for further proposals issued with this newsletter.

TRANSEND

The TRANSEND (TRANsferable Skills in Engineering and their Dissemination) Project started in January 1998 with the aim of*….identifying the best practices in student support and guidance methods for the development of personal and professional transferable skills, and to transfer and disseminate these methods for the benefit of others in the academic community.*

The project is being run by a consortium of four universities, the University of Birmingham, University College London, the University of Newcastle upon Tyne and the University of Surrey. Funding has been provided by the Higher Education Funding Council for England (HEFCE) through Phase 2 of the Fund for the Development of Teaching and Learning (FDTL). The project team are responsible for running the project on a day-to-day basis, they consist of a project leader (Ms. Deesha Chadha) and 2 project officers (Mr. Ruben Rodriguez and Ms. Alex Cass).

There are four stages to the project:-

Stage 1 - review and collation of existing good practice
Stage 2 - analysis of good practice, determining elements of good practice to disseminate
Stage 3 - exchange of good practice across the consortium
Stage 4 - wider dissemination and transfer of good practice

The first three stages of the project have been completed and reports on the outcomes have been published or are being produced. We are currently in the dissemination stage of the project and have already had a number of successes. Good practice has been transferred both internally, through the setting-up of a bolt-on skills development course at Birmingham and externally through workshops and consultations which the project team are still organising and running. If you would like more details with respect to the dissemination material generated by the project and financed entirely through project finances, please contact the project office. Or visit our website for further information,
http://transend.cpe.surrey.ac.uk

TRANSEND Project Office
Department of Chemical and Process Engineering
School of Engineering in the Environment
University of Surrey
Guildford, Surrey.
GU2 7XH

Tel: 01483 879475
Fax: 01483 876581
Email: transend@surrey.ac.uk

Report by…
Ms. Deesha Chadha
University of Surrey