148P *IN SILICO* PROTEOMICS – A NOVEL APPROACH

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One of the most significant disciplines to develop in the post-genomic era is that of proteomics. With the number of genes now more or less defined for the human genome and the number of potential drug targets apparently smaller that originally expected, the focus is now changing to the identification, analysis and cataloguing of all the different protein variants in every conceivable cell type under a multitude of conditions. The huge amount of genomics data now currently available will soon be dwarfed by a deluge of proteomics data.

The proteomics field is dominated by laboratory-based technologies with associated bioinformatics tools enabling projects to be run faster and on a much larger scale. However, while such efforts with provide a wealth of new data, alternative approaches will also be required in order to understand the complex interactions that exist within the proteome. One such approach is the emerging field of *in silico* proteomics. This concerns, the prediction of aspects of protein structure, interaction or function.

By way of introduction, a number of studies that seek to determine predictive rules for protein functionality from biological data will be reviewed. The approach taken by Proteom will be described with reference to its proprietary informatics platform and progress in the design of peptide ligands, the prediction of binding sites on proteins and the prediction of protein-protein interactions.

149P WHAT CAN TEACHING AND LEARNING RESOURCE PACKS DO FOR YOU?

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Funding under the Teaching and Learning Technology Programme (TLTP) 2 enabled the development of 45 computer-assisted (CAL) packages and videoclips dealing with a wide range of topics in pharmacology. More than 1750 copies have been supplied worldwide. However, staff reported that there were constraints to the implementation of such technology based teaching materials, such as lack of time to develop support materials and use these methods, and a culture which did not promote non-traditional approaches (Markham, Jones & Sutcliffe, 1997). Student usage of CAL increased if it was integrated into the course and if it was assessed (Dewhurst & Hughes, 1999).

The main aim of the pharmacology TLTP3 project was to assist staff to embed CAL packages in the curricula. This process was to be achieved by the development of Teaching and Learning Resource Packs (TLRPs). These TLRPs contain already prepared teaching material for staff that give students tasks to do, based around one or more CAL packages. TLRPs may contain workbooks, exercises, multiple choice questions, problem-solving exercises, problem-based learning exercises, cases and assessments. Most come with Tutor notes and, where appropriate, model answers. The TLRPs are designed to be customisable for local needs and so are in electronic format (Word and PowerPoint). They are useful for a wide range of students (science, medical and para-medical).

To ensure that the TLRPs were of a high standard and could meet varied needs, there was a defined development cycle. In the first year a small team of pharmacologists (2-5) from different Universities developed the material and trialled it in their own institutions. Other members of the consortium formally evaluated these TLRPs in the second year. Evaluation was overseen by people not involved in the development process (Norris, 2001).

Seven TLRPs were completed by September 1999 (Hollingsworth *et al.*, 1999) and copyright invested in the British Pharmacological Society to make them readily available. A further 12 TLRPs can now be obtained on the following topics: Enzymes as Drug Targets; Ligand-Gated Ion Channels as Drug Targets; Drug Metabolism I and II, Haemostasis; Clinical Trials and Drug Development; Synaptic Transmission in the CNS: Dopaminergic Transmission I and II; Pharmacokinetic Simulations; Calculations for Pharmacologists; Blood Pressure Simulation. For full details go to http://www.bps.ac.uk, Educational Resources.

Dewhurst, D.G. & Hughes, I.E. (1999) *Br. J. Pharmacol.*, 127, 89P.

Hollingsworth, M., Hughes, I.E. & Dewhurst, D.G. (1999) *Br. J. Pharmacol.*, 128, 303P.

Markham, A., Jones, S.J. & Sutcliffe, M. (1997) *Br. J. Pharmacol.*, 120, 376P.

Norris, T. (2001) (This meeting).

150P A MULTI-SITE EVALUATION OF A PROJECT TO IMPLEMENT CAL IN UNDERGRADUATE PHARMACOLOGY TEACHING

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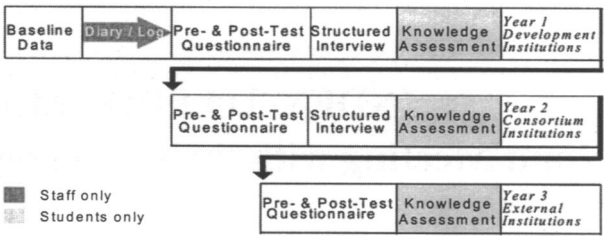
Teaching and Learning Resource Packs (TLRPs) have been developed to aid integration of computer assisted learning (CAL) packages into the curriculum (Hollingsworth 2001). The University of Edinburgh is managing evaluation of the process of development, the products (TLRPs) and their educational effectiveness. To facilitate the process, and involve as many of the project stakeholders as possible (who by tradition are highly sceptical of process-based evaluation), we have developed guidelines, designed a range of 'off-the-shelf' evaluation tools (e.g. pre- and post-test questionnaires for staff and students, and pro-forma log sheets), some of which are on-line (http://webdb.ucs.ed.ac.uk/lts/tlrp), and appointed a FT research assistant to process the data. This strategy means that stakeholders need only disseminate the evaluation tools to staff and students and return them for processing rather than carrying out the analysis themselves.

TLRPs were developed and internally evaluated in year 1, they are then re-evaluated in consortium institutions in year 2 and re-evaluated in institutions, external to the project in year 3. The evaluation cycle is shown below (Figure 1).

Figure1. Evaluation cycle



This strategy has been successful in that we have now collected data from 14 centres. The first sets of TLRPs are just entering phase 3 of their evaluation. Preliminary data based on data collected from the evaluation of the TLRP 'Pharmacology of Inflammation & Pharmacology of Asthma' indicates that:

- The TLRP/CAL was relevant and met the needs of a range of students from different course backgrounds
- Students want to see CAL/TLRP used to supplement rather than replace traditional teaching methods
- Major drivers for students to use CAL were: having workbooks associated with CAL, the use of the CAL being assessed and the lecturer recommending specific CALs
- Staff found the pre-prepared resource (TLRPs) was useful, often requiring little modification i.e. showing there is evidence of time saving.

Hollingsworth, M. (2001) (This meeting)

151P WHAT HAVE DATABASES EVER DONE FOR US? MANAGING THE TASK OF ASSESSMENT WITH A WEB-HOSTED DATABASE OF QUESTIONS

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Teach and Learn (TAL) is a Computer-Aided Assessment (CAA) resource that has been developed in Bristol but is available to any HE institution in the UK. In addition to being web-based, the beauty of TAL is the use of an industry standard database to store the questions and associate each with a full set of metrics that together both describe and classify the question. TAL is used, principally by the departments of Maths/Engineering and Chemistry, to deliver tests for both formative and summative assessment. The TAL system is extremely versatile; many of its operational features will be demonstrated in the presentation.

For TAL to be useful within biomedical sciences, however, there must be a means to categorise questions that reflects the breadth of subject material. Until recently, TAL currently lacked the means to accurately classify biomedical questions, which partly explained why TAL was not more extensively used in biomedical departments. To address this we have adopted the system of Medical Subject Headings (MeSH), a biomedical thesaurus, developed and maintained by the American Library of Medicine, that is used in academic databases such as PubMed and Web of Science.

The TAL project is used by several UK HE institutions and by several departments within Bristol. With the implementation of MeSH as a means to categorise questions, the way is open for TAL to be used more widely by biomedical departments in the faculties of Science and Medicine.

Several departments use the multiple choice question (MCQ) format in paper-based tests. Whilst simple in principal, there are significant logistical problems associated with maintaining a large bank of MCQ questions. These logistical problems become compounded if staff are required to track details such as:

- Question author
- Target group: Programme and Level
- Date last used in examination
- Average values for correct/incorrect responses for each examination

These logistical problems are minimised using a database to associate the questions and associated fields. The database that provides this dimension to TAL is Oracle, an industry standard database that is widely used within Information Services in Bristol.

In practice, TAL is used most often to provide self-assessment tests to students. Access to objective tests has been shown to improve deep learning and, if adequate feedback is provided, such tests exemplify a student-centred learning activity. Moreover, CAA has the potential to support the learning of large groups of students, and offers economies of scale; it requires no more effort to make web-based CAA available to one student compared to one thousand students.

It should be clear that properly supported self-direct learning and computer aided self-assessment offers our best chance of providing a stimulating and challenging learning experience for students, particularly as staff student ratios worsen. In addition, CAA can be used to test the attainment of benchmark levels of competence. For example, additional help in mathematics could be targeted specifically at those students who score poorly in a CAA test designed to test student's ability to solve basic mathematical problems. This 'benchmarking' approach can help target resources to support the learning of an increasingly diverse student population.

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