Heads of University Biological Sciences

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"E - Biology" - the use of IT in Teaching and Learning

Web Based Publishing

Simon Rallison and Amanda McLean-Inglis, Blackwell Science

Many of us have experienced the frustration of finding that the particular article we want, with the interesting title and absorbing abstract, is in a journal that the library although once did no longer subscribes to. Then the wait for the inter-library loan which on arrival is put at the bottom of the 'to do' pile, the impetuousness of finding the article having long since disappeared. These increasing reductions in the number of journals available in libraries have been attributed to a number of factors including publisher's profits and the under-funding of libraries. All, in short, boiling down to a lack of funds to purchase these journals. Publishers have perhaps taken the brunt of the blame for this demise; however, this blame may well be misplaced as Andrew Odlyzko showed with his analysis of library budgets in North America. This study shows that it is the library overheads that are the library's money grabber and not the cost of the journals, and thereby he urged publishers to develop information systems that reduce library overheads.

Libraries have taken their own course of action in an attempt to reduce their own expenditure but at the same time increase the number of journals they can provide. The National Electronic Article Resource (NEAR) was a proposal from Vice Chancellors of Kansas and Caltec who suggested that all researchers should have the right to access the work of other researchers without charge, and they should store all their articles in a national archive which would offer free access. However, this approach removes the step of refereeing work, which brings into play the question of the quality of the research being presented. In Europe the response has been a life sciences portal accessible without charge, however, linking to the full text of journals may or may not incur a charge depending on the publisher.

The idea of a central server providing free access where authors can 'publish' poses two problems. Firstly, what now constitutes a publication? Traditionally an editor would only take a paper that is original in the sense that it was reporting original research that had not been published elsewhere. However, editors are now being offered papers that have been available from, say, the author's website. Is the author then the first publisher? Secondly, what happens to the value added by the publisher through linking, searching, refereeing and proof reading?

Blackwell Science has asked the simple question, what do authors want to encourage them to publish? Highly important is the quality of peer review and speed of publication, but also important are communication to the widest possible audience, publication in high impact journals and retrievability through databases. The two factors determining where they submit their work were availability of an online edition and availability to submit electronically. The obstacles to publishing were highlighted chiefly as delays in publication through the peer review process and/or delays in the editorial process.

Blackwell Science proposes to overcome these concerns by providing an electronic editorial office to speed up the editorial process. This is also intended to speed up the publication process by moving from the traditional issue based journal to a dynamic article by article publishing on the web.

The electronic editorial office provides a central editorial office regardless of where the team is based providing increased efficiency, savings on costs, particularly from mailing, and savings on time. This in itself is proposed to reduce costs to libraries. If research is to be published this way on the Web it would allow quality control by the author at the proofing stage and the ability to have moving pictures, video clips and links to other relevant material within the published work. Web based publishing works very well in theory with an enormous range of advantages over the traditional paper copy, but in practice the biggest challenge may well be cultural not technical, changing the way people work.

Q and A

Prof. C. Branford-White, University of North London.

Question. How would Blackwell Science make their money and would they give identification numbers in order to charge people when they accessed the information?

Answer. I predict an increase in revenue and a decrease in costs with online systems, making money in that way. They would probably introduce subscription charges for online use.

Prof. Fewson, University of Glasgow.

Question. American journals are dominant, would the ease of publishing online mean that only the top ranking journals survive?

Answer. Low ranking journals may well disappear and it is true that the Americans have a headstart in terms of online publishing.

Dr. R. Rayne, Birbeck College, University of London.

Question. Why would journals become cheaper online, surely there is not such a huge discrepancy between paper publishing and online publishing as peer review, editing and the such is still required?

Answer. I predict that online publishing would produce a 10% discount on present prices.

Teaching Bioinformatics

Dr. James Milner-White, University of Glasgow.

While some of us are still wondering what bioinformatics is, those of us in the know are pondering how best to teach this new discipline to the people of tomorrow. This seemingly simple question is not so easy to answer. Bioinformatics encompasses biological data, programming and information technology allowing the interpretation of sequencing and 3-D structure of any of a number of types of molecules. So should this divergent discipline be taught in part with an undergraduate course, as a one-year masters course or become an undergraduate degree scheme in its own right? Once that has been decided what ideal background should the student have? Biochemistry with an interest in computing, or computer programming with an interest in biology? Each has its positive and negative points with one of the subject not being fully understood, and perhaps gives justification for the necessity of an undergraduate bioinformatics degree.

The University of Glasgow has already made some headway into this problematic region. A one year masters bioinformatics course has been made available since September 1999 incorporating pre-term programming, programming and information technology, biology and a 15 week research project. This course is not for the weak hearted. The biological side of the syllabus includes biomolecular sequencing and structure, metabolic simulations, neuroinformatics, molecular energetics, enzyme catalysis, statistics and mathematics, the latter encompassing the dreaded calculus, vectors, matrices and geometry. The mathematics is essential for programming and the computer syllabus includes both low level, Java, and high level, Perl, languages. Students are also expected to create websites, thereby using html, and use

databases such as SQL and ORACLE. We were assured that these courses are not expensive to run, there being no need for the high specification pieces of computer equipment that most of us were envisaging. Simply required is a computer for each student with Windows 95 running on Novell netware, UNIX machines for running programmes such as GCG (Genetics Computer Group) for sequence analysis, and a web server all of which are found in most universities. The biggest problem it would seem comes from the students themselves, the well-known aversion of biology students to mathematics making the learning of programming difficult. However, once mastered these skills are well sought after by industry for doing drug and pesticide design, and biopharmaceuticals. Considering a substantial proportion of biology students do not continue in the discipline of their degree after university, bioinformatics should perhaps be an undergraduate course that many more universities are offering to prospective students.

Q and A

Prof. K. Gartland, University of Abertay.

Question. Bioinformatics as an undergraduate course is not successful as prospective students do not know what it is at school.

Answer. I agree, also the other problem is that mathematics is not a biology strong point.

Dr. D. Griffin, Brunel University.

Question. Bioinformatics is not an interesting name and do you have trouble recruiting staff?

Answer. Biocomputing was equally unsuccessful, and we have no trouble obtaining staff.

Student Centred/Distance Learning

Prof. David Male, Open University.

Professor David Male presented 'Electronic Media for Learning Biology' with the emphasis heavily on 'learning' rather than 'teaching'. Although electronic media makes up only half the material for an open university course, the impressive demonstration of the possible knowledge to be gained with CDROM material made one wonder how long it would be before the classroom became a thing of the past.

Many of us are used to seeing artistic impressions of molecules bouncing across screens to aid in the teaching of complex biological processes, however, electronic media has much more than brightly coloured molecules to offer. It is possible to emulate instruments, produce virtual environments, 3-D structures, perform model and mathematical analysis and allow self-assessment of students. Members of the meeting set up a digital microscope, were taken through the glycolysis cycle, visited

and trekked through the forests of Baro Colorado Island, found a number of weird and wonderful animals with some tenuous link to the elephant, built an energy flow pyramid from the humble oak leaf to a fledgling sparrowhawk and were reminded of the complexities of viral infection and the immune response. All this within the hour and all without leaving our seats. Of course some would argue that emulated instruments aside this could all be learnt through traditional text material, albeit taking somewhat longer to find the relevant material and being far less fun. However, the printed word has reached its summit, pages after all can only become so glossy, whilst electronic media is in its infancy. Already the core material provided on the CDROM has hybridised with the world wide web directing the more interested to up to date material provided on relevant web pages. Yet still we can expect more to come with the quality of programmes constantly improving and intelligent programmes becoming available allowing customised learning, identifying strengths and weaknesses in students and applying programmes accordingly. So are bleary-eyed students at 9 o'clock lectures a thing of the past? I guess only time will tell.

Q and A

Dr. I Giles, University of Southampton.

Question. How long does it take to prepare material, and is it cost effective?

Answer. The immunology CDROM shown cost £250,000 to produce initially, but over long term use this does become cost effective.

Dr. G.K. Baggott, Birbeck College, University of London.

Question. Does it promote student learning?

Answer. It is very popular with the students and the electronic assessment has obvious advantages.

Dr. D. Daltrey, Leeds Metropolitan University.

Question. Can old programming systems be updated?

Answer. You would have to determine whether it was worth updating these programmes in terms of cost.

Computer Based Assessment-More Than Multiple Choice

D O'Hare, Centre for Interactive Assessment Development (CIAD) University of Derby.

Student assessment is necessary not only to monitor progress and to grade students, but also as a form of feedback for the effectiveness of teaching and learning methods, and of course if it is not assessed in all probability the students won't do the work. All I am sure are painfully aware of the assessment environment

be this in the form of essays, reports, notebooks, short answer questions, seminar presentation and the much-dreaded viva voce. Disproportionate amounts of time are devoted to the marking of these assessments and the subsequent grading. Therefore, it is no wonder that a lot of interest has been directed toward computer based assessment (CBA) especially, as our speaker described, these no longer just consist of multiple choice tests.

CIAD (http://www.derby.ac.uk/ciad/) provides a service for the design, production and delivery of CBA using the tripartite Interactive Assessment Delivery System (TRIADS). The Triads system philosophy is to have a minimum constraint on question design, a maximum flexibility for tutors and a maximum ease of production and delivery. In order to attain this it incorporates basic interaction types such as point and click, cut and paste, moving objects, drawing and text in a range of interactive question styles that puts simple multiple choice questions to shame. It would seem that CBA can accomplish everything that the typical written assessment environment can and more. Although computer based essays are not available, it being difficult for a computer to mark a series of pros, this area of assessment has been tackled by providing a number of statements that may or may not to varying degrees suit a given essay title. Communication skills, as analysed in essay writing, have also been tackled with comprehension style questions.

The CBA also manage to teach as well as test, elaborating on correct answers and helping students to work through incorrect answers. The possibility of students gaining marks through guesswork has also been addressed by incorporating negative marking. However, CBA has not reached its pinnacle yet. Its maximum potential will come through imaginative and innovative designs, clear aims, a well-balanced population of questions to obtain desired mark profiles and the necessary evaluation of the performance of certain question styles. In order to accomplish this CBA need informative feedback to ensure the correct balance of questions and the removal of bad questions that may produce unpredictable results.

For those of us who have spent many a long night marking written assessments, the range of CBA question styles and the speed at which marking, grading and feedback can occur, alongside the objectivity and consistency of standards a computer can provide that no student can quibble with, certainly makes this style of assessment attractive for future use.

Q and A

Insufficient time for questions.

Introduction to LTSN and Virtual Learning Environments

Dr. Andrew Booth, University of Leeds.

Virtual Learning Environments

'The hard truth is without a VLE/MLE a University is not sustainable far into the 21st century' J.Slater 2000. All very well but what exactly is a VLE, or a MLE for that matter, and why should universities consider using them?

VLE's (Virtual learning Environments) bring together publishing, CDROM material, assessments and support for students in one self-contained piece of software. The software is provided over the world wide web requiring authentication and conditional access through a login and password system. This in turn allows restrictions to be put in place on websites that individuals are allowed to 'see'. Market leaders in this particular field are Blackboard, produced by Cornell University, and WebCT, produced by the University of British Colombia. Others include COSE, coMentor, colloquia, FirstClass and Bodington. MLE's (Managed Learning Environments) are slightly different combining a VLE with off line learning, registration of students and contact with other colleges, thereby requiring information to be checked before making it publicly available. Both environments allow flexibility, that is freedom from restrictive time-tabling, ease in course administration allowing staff to deal with large numbers of students, support distant learning students and provide an environment for student centred collaborative learning.

With that as an introduction members of the audience were taken through the corridors of Leeds University using the Bodington VLE. The software provided lists of the modules available for courses, discussion areas, assessments, resource of information and online practicals. Of course in our student role time was chiefly spent in the discussion area which is best described as a bulletin board where questions are 'pinned' as it were in all hope that they will be answered if not by fellow students then perhaps by the lecturer who in all probability posed the question in the first instant. The readers of these questions are recorded meaning for example on the one hand that lecturers once having read the question cannot deny knowledge of its existence, but also that students once having read that an exam/assessment is eminent cannot come out with the old chestnut that they were not told and therefore are not prepared.

The software does not act as a full course but acts as a support for existing courses, allowing interaction between students and staff that otherwise may not be possible due to class sizes and time constraints. Problems arise in that this source of information must be made available to all students, including for example the partially sighted, and the interoperability of these systems so that standards do not change from one university to the next. The examination of VLE's to this standard is not simple primarily because of the need for a login and password to access each VLE. Therefore, to those that are interested prizes are being awarded for ideas that may be used to improve the environment of these systems.

Learning and Teaching Support Network

LTSN (Learning and Teaching Support Network) is a national network with 24 subject centres around the country. It has been set up to promote and support high quality learning and teaching in all subject disciplines for higher and further education. It accomplishes this primarily by acting as a repository of information, but also providing a channel of communication. Information is present in the form of a knowledgebase providing an online database for teaching and learning materials, which are subject specific covering courseware, news and events. The LTSN centre for Bioscience is based at the University of Leeds, in association with the University of Aberdeen, and has three subject specialists to cover the broad range of courses covered under this title. Not wishing to reiterate further the information that is

available on the LTSN website, and certainly not putting the message across as well, I suggest that interested parties visit their website at http://bio.ltsn.ac.uk

Q and A

Insufficient time for questions.

Update on Biosciences Benchmarking

Prof. Paul Brain. University of Wales, Swansea.

Biosciences is a term that covers a wide range of topics and yet seems to leave out some of the most obvious, for example pharmacology is included whilst pharmacy is not. It also manages to overlap with other disciplines such as agriculture and biomedical sciences. In an attempt to clarify what bioscience is, 'it is a range of sub-disciplines all of which include the study of diverse and variable living organisms and systems, often in changing environments'. As such it covers a number of UCAS degree titles. However, it is a title widely recognised by prospective students and applies to degrees taught in a wide range of departments. This of course does not make benchmarking any easier.

In the new QAA academic review methodology the Self Evaluation Document (SED) is central to the process of subject review. The programme specifications that have to be placed in the SED must provide core factual information about the programme with explicit learning outcomes, knowledge and understanding, skills and other attributes as defined in the subject benchmark statement. The benchmark statements are 8-10 printed pages and divided into,

1. defining principles

2. nature and extent of subject

3. subject knowledge and understanding

4. subject skills and other skills

5. teaching, learning and assessment

6. standards.

However, it is uncertain who is the primary focus for these statements, the bioscience community, HE professionals, potential students, their parents or prospective employers. Initially it would seem that the statements are for QAA review function and this will later be reviewed.

Information on benchmarking has been provided on a web page at www.biohubs.org and the group involved in this process would very much like some feedback which should be addressed to bm.biosciences@qaa.ac.uk Questions raised by this group thus far involve how much students should be expected to know. As examples should all scientists have some knowledge of molecular to organismal to environmental science? Should all students be expected to have hands on experience and what is the value of project work? As science has a high public profile should all students be trained to deal with ethical safety and exploitation issues? The group next meets on May 11th , with the final draft being expected by the end of June, I am sure any input would be gratefully accepted by all involved.