The

TELRI

Technology Enhanced Learning in Research-led Institutions

Project

CASE STUDY

Information Technology for Chemists

Evaluation from implementation in courses

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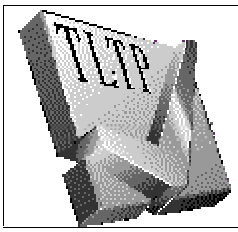

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TELRI	**CASE STUDY** **IT for Chemists**

Title **Information Technology for Chemists**	
Department	Chemistry
Institution	Oxford University
Description of the course The course aims to develop awareness of Chemistry information sources on the web and develop students' IT skills and importantly their evaluative capabilities in retrieving relevant and valid Chemistry information from the web. Students use the web search engines to discover chemistry and general information about a subject. The course makes use of Chemical Databases to explore, identify and evaluate chemical information and general IT applications to produce chemical-based documents and web sites. The students can enter into the Royal Society of Chemistry Exemplarchem competition.	**Course details** • A core course for first year undergraduates and optional course for second years. • 200 students per course • Timetabled 6 learning hours for the first years and open access for the second year (minimum 6 learning hours).
Details of the TELRI intervention and how it aimed to enhance the learning and course activities? The students work in pairs to produce a web site about a chemical molecule or group of chemicals of their choice, incorporating chemical diagrams and/or equations and relevant pieces of chemical information found using the internet. The students must also prepare a reflective writing assignment on their approaches and outcomes. The students are asked to describe their chosen molecule using detailed chemical information and chemical data. They are asked to include broad information such as the manufacturing information and processes, medical properties and deduce and draw its chemical structure. A piece of reflective writing and group discussion was introduced as a requirement for the course. This aimed to overcome the	**Other teaching methods used to support activity** • A single introductory lecture. • Two computer lab based sessions. • Guidelines and examples of chemical information sites. **Other technologies used to support activity** CrossFire is a comprehensive chemical information service, covering over 200 years of primary literature. The two databases, Beilstein (organic) and Gmelin (inorganic), collectively comprise more than 9 million organic, inorganic and organometallic compounds. http://www. mimas.ac.uk The students create their own web pages for reporting on their chosen chemical using

previous tendency for students to follow a procedural approach to finding and using web-based chemical information and enhance their critical analysis and evaluation skills. At the start of the course, the students are provided with a questionnaire that addresses a number of issues in professional practice that encourage them to reflect on their choices, working processes and outcomes throughout the course. A reflective journal forms part of the assessment of the course. The students publish a first version of their web site along with a reflective analysis summary of their approaches to retrieving and evaluating the required chemical information and data. They must address the issues raised in the questionnaire, publish their reflective writing piece to a discussion board (WebBoard) and comment on the approaches and views of the other students. At the end of the course, the students must publish their final web site and reflective account to the course web site for assessment by the tutor.	Netscape Composer. The course tutor uploads the students' web pages into a course web site.
How the course was previously run (if applicable) The students worked as individuals (although in timetabled sessions in groups of 20) and the assignment task was limited to the production of the finished web site as an indication of completion of the work.	**Problems with previous teaching methods** The course had previously concentrated too heavily on output and it was difficult to evaluate whether the students were developing the thinking processes the tutor intended.
Intended capabilities to be developed • Research skills in using IT packages, search techniques. • Evaluation and critical analysis of approaches and validity of data. • Communicating one's ideas and presenting a written account of reasoning and justification for one's choices. • Creativity and innovation.	**Methods of assessment** In the first year course, the students must publish a web site of their chosen chemical and present the chemical information and data they have discovered. At the end of the course, they must submit a piece of reflective writing on their approaches and evaluation of the web-based sites and information found. The final web site and reflective account is assessed by the tutor as Pass/Fail. In the second year course, the students must also write a paper in MS Word containing chemical drawings and relevant chemical equations and facts about the chemistry of the molecules assigned to you. The reaction chemistry should be referenced to the chemical literature using Beilstein.

Problems in setting up the course or technology None. Simple IT tools were used for student web publishing and training courses for all IT packages were provided.	**How these were solved**
Extent of development of intended outcomes **TELRI evaluation** The course provides the students with technical IT skills, an awareness of the vast wealth of chemical information and data available on the web, along with an understanding of the issues concerned with validity of the sources and approaches in professional practice.	**Academic tutor evaluation** The students produce some very good work despite the limited time allocated to the course. They are highly motivated and enjoy the activities. Overall, the learning outcomes of the course are being met since the students mostly develop competence using a range of IT applications and databases as well as an awareness and critical view of the chemical information available on the web. The quality of the students' work is generally high even if the creative flair is more apparent in some of the finished web sites than others. **Students evaluation** Students find the course very popular since it takes them away from pure chemistry knowledge to more challenging searching and evaluating activities. The majority preferred to choose their own chemical molecule rather than being assigned one.
Unintended benefits or costs **TELRI evaluation** (e.g. leading to changes in course design model or tool design) In the current situation, the tutor provides a course web site and must manually create a link to the web site produced by each student. With 200 students, this is very time-consuming. An automated system for the students to upload the URL for their web site would be simple to implement using either a basis web form or within the WebBoard environment.	**Academic tutor evaluation** (e.g. leading to changes in teaching practice) An automated system for uploading the student web site links would be useful. It would also allow the students themselves to categorise their chosen chemical (at present, I do that for them.) The questionnaire can be re-used for each year since there are no right or wrong answers to the issues raised. The best web sites and reflective writing from each cohort of students on the course can be used to provide examples of good quality work in future runs of the course. This may avoid the students using the current guidelines and examples as rules and procedures for their own approaches.

	Students evaluation (e.g. leading to changes in learning practice) There is a tendency to spend more than the allocated 6 hours on the course since students generally wanted to produce a nice looking web site. Students who used a reflective journal approach, i.e. wrote their musings alongside the exploration of web resources and production of the web site, seemed to find this task less stressful than those that prepared the piece as a single task.
Cost-effectiveness analysis (e.g. factors such as learning quality, staff time, ease of transfer to other courses)	**To what extent can the course design approach support higher student numbers?** The numbers of students is dependent on the available tutor time for assessing the final web sites and reflective writing pieces.
Further developments planned for this or other courses In later implementations, it would be helpful if the students could publish their reflective writing alongside their web site and invite comments by fellow students. Groups were formed on a college basis so that each student discussed approaches with at least four others.	

Student web pages