6. Learning Technology in the Institute of Biomedical and Life Sciences at the University of Glasgow

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**Course :** 3rd year Pharmacology  
**Software :** TLTP PharmaCALogy

This study describes a trial implementation of one module of a computer assisted learning package on drug metabolism. The key points to emerge from it are:

- Students found that using the package promoted their understanding of the subject matter.
- Students were introduced to software during a lecture, thereafter use of the computer package was timetabled.
- Lectures have now been replaced by a mixture of practical labs and student directed learning sessions.

**Background**

The Level three Drug Metabolism course had been slowly eroded over the years between 1978 and 1994 from a full three week unit of lectures and practical labs to a short five-lecture course. This was in part due to the increasingly negative reaction of students to the high chemistry content of the course. Financial pressures had also limited the practical lab resources to the point where they could not provide the equipment and task demands which would best enable the students to attain the learning objectives set.

Supported by TLTP Phase 2 funding for the PharmaCALogy consortium, with the University of Glasgow as a leading site, the course teacher authored a CAL package to present the lecture material, supplemented by a diet of practical tasks, over a series of student directed learning (SDL) sessions.

**The CAL package**

The courseware is a highly interactive, graphics-supported package which introduces the basic concepts of drug metabolism. It uses animations to show what happens when a drug is metabolised by the liver, allowing each stage to be examined in greater depth in terms of the actual chemical reaction, the enzyme involved and the cofactors needed. Following each section there is a short quiz with the option of more extensive questions, before the student exits the package. There is also a glossary of drugs and a map function to facilitate navigation round the learning units.

**Trial implementation**

The CAL material was under development during the 1994-95 academic year, with an introductory section developed sufficiently to run as a trial with the student class. It was decided that, with the developed unit and with the enhanced materials available, though not in digitised format, the course could expand to seven SDL sessions, four lectures and one review session. The original five lectures were covered in two of the SDL sessions, freeing up lecture time to allow a more discursive treatment of drug metabolism and drug toxicity. The thrust of the change at this point was not, therefore, to reduce student contact time, but to enhance the course content and hopefully, for both students and staff, the enjoyment of the course.

The software was introduced to the students during a lecture period and thereafter timetabled into lab sessions, to be worked through by pair groups of students.

**Evaluation**

It was agreed that the evaluation capability which was being developed within the University's institutional TLTP project, Teaching with Independent Learning Technologies (TILT) should be utilised for this trial of the CAL materials in student use.

A questionnaire was administered to the students at the end of the course, containing open questions about the course in general. The responses showed that several aspects of the course content were particularly well regarded by the students, and increased their interest in biological science as a subject. "...specific drug pathways - helps
understanding of their mechanisms." "I just find all the mechanisms at work in the body fascinating, also how we can manipulate these mechanisms." "...makes it seem like you're doing some real pharmacology work."

Students liked working in pairs through the tutorial software, pointing out that this was familiar practice from physical laboratory sessions. They felt it was more useful to be able to discuss and test a hypothesis within the software than simply to watch a demonstration. As one student said, "It puts theory into practice without the hassle and unpredictability of labs".

However, few students clearly felt that physical labs should be entirely replaced by simulations, as the acquisition of skills in experimental procedures was seen as valuable. Against this has to be set the expense of practicals in this area, the ethical questions raised by the use of animals in experiments and the use of radiolabelled compounds.

A tailored version of the TILT resource questionnaire was also administered to gain some insight into how the students used the different resources available to support their learning during the course, and whether the amount of time available to study this course was sufficient to allow them to make full use of the materials. This was given to the current course and, with the CAL component removed from the options, retrospectively to the group of students who had completed the course the previous year, without the CAL.

The current year's students rated lectures and class notes as more useful than did the previous cohort - possibly reflecting a greater engagement with the content as a result of using the software, which they uniformly rated as a highly useful resource. It should be noted here that the comparison was not simply between the course with the CAL and without it, as the previous year's course had been shorter, lacking the extra content brought in as extension and presenting the CAL based material in lecture form. All in all, where common items were rated, the current student responses were more positive. Most of the students felt that the pace of the course was fine, with the right number of SDL sessions timetabled to cover the material.

No precise comparison of assessment grades between the two years was feasible as, effectively, there were two different courses, though covering the same content. However, there was no marked difference between overall grades between the two years which, given the trial level of the software and the extension of the course material, should perhaps be considered a positive effect. The issue of revising assessment procedures in line with changes in learning resources was not, in this piloting year, addressed.

Outcomes
A full implementation of the CAL package was possible during 1995-96, evaluated under the Consortium procedures with supplementary focus group sessions with students at the Glasgow site. This was successful, and it was decided to run the class in the future as a mixture of SDL sessions and practical labs, dropping the lecture component altogether.