

## An online activity developing student-driven learning in molecular biology

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An online tutorial activity TOOL (Tutorial Originating OnLine) was developed to extend both interested and at-risk students in a first year molecular biology course. This course is a pre-requisite course for subsequent study in molecular biology fields and is characterised by a major laboratory focus, somewhat at the cost of not offering face-to-face tutorials. An online tutorial activity was developed to meet an identified need for some tutorial follow-up to lecture material. TOOL consists of two complementary online activities: just-in-time tutorials on the theme of the week's lectures; and a specific activity aimed at building understanding of the language of the discipline through student-supplied glossary entries to a *WebCT* site. The novel aspect of TOOL is that both activities are maintained by the students themselves. The tutorial component involves students within an online discussion forum being rostered to provide a question relating to the week's theme and the other students researching answers to be posted via a threaded discussion board activity. The glossary entry involved students (again in turn) uploading relevant terms and definitions into the public Glossary database for the online course site, via an unusual application of the *WebCT* presentation tool. The glossary terms had student identifiers, providing indirect, but positive feedback for those who contributed. Student response to the TOOL pilot study has been very encouraging, with several at-risk students (who had previously failed the course) volunteering for the project. 100% of the participants agreed they would seek to be involved in a similar tutorial system if offered in later year courses.

## A novel, on-line bioinformatics exercise in genomics

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The teaching objective of the 'Functional Genomics Lab' is to engage the students by having them incorporate benchwork with web-based technology and analyse data in a biological context. The Functional Genomics practical involves sequencing and analysing an *Arabidopsis* gene. The on-line component introduces the undergraduates to a number of general and plant-specific databases, bioinformatics principles and tools. The practical is run over several sessions. The first two involve extracting and sequencing DNA to identify an 'unknown' gene. During the third session students analyse their sequence to predict a function and perform hypothetical experiments to test their hypotheses. On-line exercises include PCR and RNAi vector design, microarray and promoter analysis using general and plant specific web-based tools.

## Teaching generic science skills online to first year biology students

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Science Skills in Context was introduced in semester 1, 2005 as a compulsory wholly online unit for first year students commencing their studies in the biological sciences at Deakin University. The concept of the unit was to teach generic skills in science using the lecture content of the first year biology unit as the scientific context. Skills addressed included critical thinking and the scientific method; an introduction to data, basic statistics and graphical representations of data; strategies for sourcing and writing about scientific information; and how bioinformatics has led to a paradigm shift in biological research. The delivery of the unit was via *WebCT-Vista* and included extensive multimedia content: instructional *FLASH* tutorials, interactive chat-room online tutorials, directed study of online materials and readings, and learning through mastery of online assessment. Examples of the teaching materials will be presented and the learning objectives and teaching strategies and their relative successes and shortcomings will be discussed together with an overview of student outcomes, participation and feedback in the unit.