Results
Before the students began the course they were asked to complete a pre-course questionnaire. The results show that, although relatively inexperienced at carrying out independent study, the students were reasonably confident about their ability to study this way. Despite only half of them having used PCs in such assignments they were confident working with computers, and about information retrieval using the internet, but somewhat less confident using the library. The group showed a range of experiences with respect to online learning.

About 3 weeks after handing in their assignments the students were given a post-course questionnaire. Overall the responses to the questionnaire were positive, and showed that the majority of students had been reasonably confident about carrying out the assignments. They enjoyed the experience, found the subject matter interesting, found the presentation helpful, and retained most of the content 3-4 weeks after completing the course. They thought that the learning method was effective, especially in comparison to the more traditional paper-based approach to independent learning, which they had encountered during the previous semester. Some students commented on the fact that a paper-based version of the learning resource would have been more convenient, since being web-based necessitated regular and reliable internet access. This was an issue as not every household had these facilities and, being part-time students, they had restricted access to the on-campus PCs.

The students' assessment results were encouraging. The marks for the continuously assessed, year long module of which 'Chemistry in Sport' formed half, averaged 67% in the first semester and 65% in the second semester. By comparison, the marks for the examined modules for that year for the same group of students averaged marks of 54% and 51%. This sort of increase in marks for a continuously assessed module is commonplace and expected.

Since the data comes from a sample of only eight students, it cannot be seen as statistically significant but provides some indication that this was an effective approach.

Figure 2: Introduction to the content

The students' assessed responses from this course showed that effective independent learning had occurred.

A copy of the resource is available from the authors.

A fuller account of this project is published in *Chemistry Education: Research and Practice*, Vol 7 (2006).

Content	Tasks
Drug use in sport, *case studies and history*	Choose athlete/learn case details/background reading
Drug use in sport, *nomenclature and use*	Find drug classes and effects
Drug use in sport, *analytical techniques used for THG, nandrolone & EPO*	Identify problems in analysis of chosen case
	Reasons for methods of analysis
Drug use in sport, *analytical instruments used for THG, nandrolone & EPO analysis and associated side effects of abuse*	Identification of health risks
	Closer look at analytical techniques for chosen case
	Closer look at problems in analysis
Energy systems in muscle cells of humans	Background reading
ATP; *energy producing biochemical*	Find chemical structure
ATP; *energy characteristics*	Find reaction and compare energy characteristics
Oxygen energy system; *aerobic glycolysis*	Predict products of reaction
Lactic acid energy system; *anaerobic glycolysis*	Predict products of reaction
Lactic acid energy system; *lactic acid build-up*	Summarise training techniques
ATP-CP energy system; *Creatine phosphate*	Find purpose of chemical in energy system
	Find and show functions of reaction
Muscle fuel; *types and sources of carbohydrates and electrolytes*	Give examples of saccharides
	Calculation of energy required from food
	Calculation of molarity of a sports drink
Energy systems; *summarisation of concepts learnt in this section*	Assigning energy systems to sporting events and justifying answers
Sporting equipment	Information retrieval
Materials chemistry; *synthesis and use of Kevlar and carbon fibre*	Account of uses of Kevlar and carbon fibre in production of materials used in sport

Table 1: Resource content and task details.

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