

[O5] e-learning: setting up a diploma in applied chemistry through the university's virtual campus

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ABSTRACT

A new Diploma in Higher Education in Applied Chemistry has been set up through the Virtual Campus of The Robert Gordon University as a result of demand by employers for training in chemistry for employees. This course replaces the former SQA Higher National Certificate in Applied Chemistry which was taught by day release. Demand for the day release course had shown a significant drop in numbers attending the course and yet the University received many enquiries for part-time modes of study. However the demand for the course was varied, some requiring distance learning, some twilight or evening classes and a few still for day release. This paper deals with our experience in setting up a distance learning course on a Virtual Learning Environment.

INTRODUCTION

For over 20 years The Robert Gordon University (formerly Robert Gordon's Institute of Technology and RGIT) has been delivering a course in Applied Chemistry on a day release basis leading to the Scottish Qualifications Authority (SQA) award of a Higher National Certificate (HNC) in Applied Chemistry. Students used to study for an Ordinary National Certificate (ONC) in Applied Chemistry at the local Further Education College before entering the HNC in Applied Chemistry course,

which was equivalent to year two of a Scottish University degree programme.

Traditionally ONC and HNC were part time courses whilst Ordinary National Diplomas (OND) and Higher National Diplomas (HND) were full time courses. There is also a difference in terms of the number of credits these qualifications carried: HNC courses have 12 credits whilst their counterparts, HND have 30 credits. ONC courses have now been dropped and in its place Aberdeen College runs an HNC in General Science (level 1), which gave entry into our level two HNC in Applied Chemistry. Considerable confusion was therefore generated as students perceived that they were taking courses at the same level rather than different levels.

The qualifications of ONC, OND, HNC, and HND were originally awarded by the Scottish Vocational Education Council (SCOTVEC) whilst secondary school qualifications – 'Highers' – were awarded by the Scottish Examination Board (SEB). In a rationalisation of awarding bodies in Scotland, there was an amalgamation of SCOTVEC with the SEB to form the Scottish Qualifications Authority (SQA). This has resulted in a review of courses and levels and the development of the Scottish Credit and Qualifications Framework (SCQF). The SCQF level 6 is set as the Scottish secondary school 'Higher' qualification, SCQF 7 as 'Advanced Higher' HNC, or year 1 Scottish University, SCQF

8 as HND/ year 2 of Scottish University, SCQF 9 as an Ordinary Degree and SCQF 10 as an Honours Degree. Thus SQA now regards all new HNC courses to be at SCQF 7 whilst an HND is at SCQF 8. The HNC in Applied Chemistry had thus become an anomaly as its contents were at SCQF 8 yet its title now implied SCQF level 7.

We have also seen a large fall in the number of students enrolling onto the day release course as fewer and fewer employers were willing to release their employees for a whole day. There has been however, an increased demand from employers and learners for courses in science following a part time mode of learning but some requests were for twilight or evening classes, some for distance learning whilst others would still prefer the day release mode. The requests are also for a broadening provision of syllabus from chemistry into biological sciences. To satisfy this demand it was decided to provide a Distance Learning course delivered through the University's Virtual Campus.

THE VIRTUAL CAMPUS



The University's Virtual Campus, which hosts a considerable number of open and distance-learning courses, provides a comprehensive infrastructure for distance learning, providing the flexibility for students to study in their own time. The Virtual Campus facilitates interaction

between staff, students and others, supporting course delivery, tutoring, and discussions. It attempts to recreate facilities to be found on a traditional university campus, such as for example the library and on-line resources, bookshop, meeting rooms, community groups etc. A large part of the students' learning experience is delivered by tutorials online or by e-mail. The practical elements of the course are taught by two one-week summer schools at which attendance is required.

THE COURSE AIMS

The course aims to develop students' knowledge and understanding of chemistry. It is intended to provide a course on which employers may enrol their employees as part of a professional career structure and it will enable employees, who went into employment straight from school, to gain qualifications at a Higher Education level. It provides fundamental knowledge and scientific skills for employees working in chemistry based employment.

THE COURSE CONTENT

On completion of eight modules (4 modules per year) the students will be awarded a Diploma in Higher Education (Applied Chemistry) from The Robert Gordon University. The modules on the course are shown overleaf.

Students must study Analytical Science 1 and have the free choice of seven other modules from the remaining nine modules. However the students are strongly advised to take at least one of the practical modules. Practical Work 1 is taught by dry laboratory exercises and a one week summer school in late August. Practical Work 2 has more extended work and could be undertaken in the place of work. For students who are employed in laboratories then accreditation of prior learning for the skills they are already using and practising is also taken

Course modules

Analytical Science 1
 Biological Chemistry
 Inorganic Chemistry
 Molecular Biology and Modern Techniques
 Practical Work 1

Analytical Science 2
 Organic Chemistry
 Physical chemistry
 Microbiology
 Practical Work 2

into account when assessing these two modules. Analytical Science 1 is a prerequisite for Analytical Science 2.

For the award of the Diploma in Higher Education in Applied Chemistry the students must pass Analytical Science 1 and a further seven modules from those given above.

DESIGNING THE MATERIALS



The module content was based on the content of the second year modules on the full time degree programme of the BSc (Hons) Applied Chemistry course to ensure that students could progress further with the diploma if they wished. This course has been taught for many years and has undergone several revisions so that we were confident that we had a viable programme of learning at second year level. Lecturers had well written lecture notes which had been tried and tested with the full-time students; however the conversion of this material

to distance learning materials was not so easy. The material now had to be able to be studied in isolation with no member of staff present. Lecture notes had therefore to be expanded and written in ways that are attractive to students. They had to be easy to follow and also needed to contain all those points of information and explanation which would be given to the face-to-face learners.

Each module was divided into topics which had to be small enough for a distance learner to be able to complete in a week. Staff therefore decided to base the topic size around their lecture provision. As each of the semesters at The Robert Gordon University has twelve teaching weeks the modules were not to contain more than twelve topics. A page limit on the topics was not set because there would be varying numbers of diagrams and pictures in the topics depending on the nature of the material. For topics such as Thermodynamics and Kinetics which contained numerical work – calculations, graphs etc, the staff were encouraged to include worked examples and several practice examples. Self assessed questions were also included in the text.

The first modules written were Analytical Science 1, Organic Chemistry and Physical Chemistry. The production of the graphical material for these modules was well within the capabilities of the members of staff writing them, however production of some of the other modules such as Biological Chemistry, Microbiology and Inorganic Chemistry began to show up problems which had not been considered at the start of the project. These modules all needed diagrams and pictures which were beyond the graphical skills of the

staff writing these materials. Under copyright rules staff could not scan in diagrams from text books and hand drawn diagrams were unacceptable to quality control staff of the Virtual Campus.

The writing team therefore decided that there was need to employ a graphics artist who was able to produce some excellent graphics for the distance learning material. For biological chemistry two chapters of the recommended text book were made available in digitized form by working with the Robert Gordon Library which paid to have these chapters converted using the HERON project (1). HERON (Higher Education Resources Online Network) offers a national service to the UK academic community for copyright clearance, digitisation and delivery of book extracts and journal articles. Both of these solutions were successful and for future projects we would employ a graphics artist from the beginning.

ENGAGING THE STUDENTS

The Virtual campus is set up so that only those students who are registered on the Diploma course can have access to the module materials for their course and the other facilities in the Virtual Campus. Students are enrolled onto the various modules by the course administrator as and when they are studying that particular module. This creates the various module groups which consist of the students studying the module, the module tutor, the senior course tutor and the administrator.

E-mail contact with the students is carried out through the Campus although a copy of their reply to the tutor appears in the tutor's Outlook e-mail box. A direct link allows the tutor to reply through the Virtual Campus. In this way students e-mail addresses can be hidden from each other and complete security exists. The tutor is able to post messages to the whole module group and students are able to email each other by setting up a contact list within the Virtual Campus.



However email doesn't allow open discussion and so an alternative way of communicating has also been set up. This is by using a Discussion Forum. Here the student or tutor can post messages and everyone enrolled in the group is able to read the message and post a reply. This is particularly useful if a student poses a question about the module as everyone benefits from the tutor's reply. The Discussion Fora have a number of strands to them: Welcome, Module content, Module activities and Module Administration.

However the most difficult task has been to get the present students to use these fora to interact. Ideally they should be able to answer queries that are posted between themselves rather than waiting for the tutor to answer each query. In the same way that full-time students might sit around discussing problems they have experienced with the course. Some students have indicated that they feel isolated studying the material by themselves yet participation in the Discussion Fora has been very poor to date.

Feedback from the students on the pilot study has indicated that it can be very boring reading material on the computer or by downloading and printing the material and so we are seeking ways of enhancing the module material with a variety of computer aided activities. These have included the insertion of suitable websites, the use of formative multiple-choice tests and the use of crosswords (2).

Future plans are to further enhance the course with more interactive activities thus engaging the students' interest. The Virtual campus has an introductory module for all students independent of course but the development of a more specific welcome and introductory short module would help to engage the students from the start.

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