

CITSCAPES Project CASE STUDY REPORT



CHELTENHAM & GLOUCESTER COLLEGE OF HIGHER EDUCATION

A CITSCAPES Publication

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1. Executive Summary

1.1. Strategic Perspective

1.1.1. College Strategy and Policy

The College has various strategies and policies in part concerned with the application of Communications and Information Technology (C&IT). Significantly, C&IT development is included within the College's Strategic Plan with reference being made to the importance of a student's acquisition of 'appropriate C&IT skills as part of their academic programmes'¹. Emphasis is placed, also, on the importance of staff training and development which is regarded as fundamental in building a C&IT fluent community.

1.1.2. Role of cCentral Learning and Information Services

The integrated Learning and Information Service allows close collaboration between library and information professionals enabling new roles, such as learning advisors, to emerge. Recent restructuring of the Faculty of Learning and Information Services explicitly focused on the issue of supporting student skills development and established a Learning and Teaching Development Department, (now Department of Learning Technology Support) which contributes to many of the C&IT skills courses.

1.1.3. Level One C&IT Skills Modules

To ensure a base level of C&IT training for all students, two compulsory skills and learning development modules have been introduced into the Undergraduate Modular Scheme (UMS). The importance of these modules is recognised and incorporated into the College's Opportunity Strategic Plan.

1.1.4. Character of Provision

Overall, a complex structure of C&IT skills provision has been developed at Cheltenham and Gloucester with identifying characteristics including a combination of:

¹ Opportunity Strategic Plan Volume 1 2000-2005, Strategic Plan number 7: The exploitation of new information and communication technologies in both management and educational contexts.

- ❑ central and devolved skills training
- ❑ compulsory and voluntary modules and courses
- ❑ various levels of certified award, ranging from none through to academic credit and external awards
- ❑ flexibility and choice of training depending on subject route, mode of study and the increasingly diverse student population.

1.2. Implementation

A variety of modes of provision exist:

1.2.1. Compulsory Credit Bearing Level One Modules

One significant component is the introduction of two compulsory skills-based modules, which have been designed to introduce undergraduate students to some of the basic C&IT skills necessary for the successful completion of their academic study. These credit bearing, level one modules count towards a student's final degree and are tailored to include a range of skills, both subject specific and generic, forming an important foundation to a student's C&IT skills development.

1.2.2. Voluntary Non-Credit Bearing Generic C&IT Skills Training

The establishment of a free, voluntary, generic skills training programme known as the Information Skills Programme (ISP) ensures all students have access to C&IT skills provision irrespective of course or ability. Developed and provided by staff from the support faculty Learning and Information Services, the sessions include generic software training and information searching skills. ISP attendance is not awarded with any recognised credit, being offered as a supportive and supplementary addition to a student's academic programme.

1.2.3. Compulsory Credit Bearing Subject Focused C&IT Skills Training

Specific credit bearing, C&IT rich, academic modules are compulsory for students on some routes where the C&IT skills provision is considered necessary for successful completion of the academic course of study and essential as necessary professional skills for a student's future employment prospects.

1.2.4. Voluntary Externally Certified Awards

The Computer Literacy and Information Technology qualification, CLAIT, and the European Computer Driving Licence, ECDL, are offered as voluntary opportunities for students to gain a recognised C&IT qualification. This is especially encouraged for students within the School of Education as completion of these awards can count as evidence towards their achievement of the Government requirement 4/98² which asks that all trainee teachers show evidence of effective C&IT use.

1.2.5. Specialist Software Provision

Specialist software training using *PhotoShop*, *SPSS*, *NUD*IST*, *Compel* and some Web editors is available to postgraduate students and staff, and is provided by specialist staff from various academic faculties.

1.3. Emerging Directions

There has been a positive surge towards providing learning materials, and supporting academic modules, using on-line methods, with the use of *WebCT* growing from eight to sixty courses in just eighteen months and the number of *WebBoard* conferences totalling over two hundred. Educational benefits beginning to emerge as a result of using on-line learning environments include increased reflective practices, collaborative and group learning skills, the ability to work and learn independently as well as the development of practical C&IT skills.

The changing skills base and diversity of the student population, resulting from the national agenda for widening access and participation, poses questions about how Higher Education Institutions accommodate skills support for students of the twenty-

² For further information on the 4/98 requirements please refer to section 4.6.3 of this case study.

first century. C&IT is now regarded as a necessary graduate skill and the benefit of acquiring a recognised C&IT qualification, in order to provide evidence of C&IT competency, is being investigated. To what extent these issues will develop has yet to be discovered, but they are likely to be important factors in the future development of C&IT training within the College.

2. Introduction

2.1. General Overview of the HEI

2.1.1. Location and Character of Institution

Cheltenham and Gloucester College of Higher Education (C&GCHE) is a college in the university sector³. Currently located on three main campuses in Cheltenham - Park, Francis Close Hall (FCH) and Pittville - the College plans to open a fourth new campus in Gloucester in 2002, responding to the need to widen access and participation in higher education in Gloucester.

C&GCHE was formed in April 1990 with the merger of the College of St Paul and St Mary with GLOSCAT (HE). Since 1992 the College has fully modularised its BTEC, undergraduate and taught postgraduate programmes⁴. The College awards undergraduate, taught postgraduate and research degrees in its own name and in addition offers a wide range of courses leading to certificates, diplomas and professional qualifications. It is currently awaiting a decision on its application for university title, following a year-long scrutiny by the Quality Assurance Agency.

The College's mission is to 'provide an accessible high quality learning environment that is innovative, challenging and enterprising'⁵. The culture developed by the College is prided in being:

- Excellent but not inaccessible
- Christian but not exclusive
- Nurturing but not constrictive
- Responsive to the needs of its particular location but not parochial⁶.

³ C&GCHE 'The College' <http://www.chelt.ac.uk/college/college.htm> accessed on 14.11.2000

⁴ Opportunity Strategic Plan Volume 2 2000-2005 p.2

⁵ Cheltenham and Gloucester College of Higher Education, Postgraduate Prospectus, 1999-2000, p.92

⁶ C&GCHE 'Vision, mission and values' <http://www.chelt.ac.uk/cwis/pubs/stratplan/vmv.htm> accessed on 1.3.2001

2.1.2. Staff/Student Figures

Describing itself as a vibrant, friendly and progressive community⁷, the College supports over 9,000 full-time and part-time students and approximately 1,000 members of staff.

2.1.3. Management Structure

The model comprises a College Committee Structure, a Management Structure (Directorate and Senior Management Group), Faculties, Schools and Departments. (See Appendices)

2.1.4. Faculties

There are seven faculties within the institution. Four of these are teaching faculties: Arts and Humanities (A&H), Education and Social Sciences (E&SS), Environment and Leisure (E&L) and the Gloucestershire Business School (GBS). Other faculties include the Graduate School which supports the College's postgraduate community and administers the Postgraduate Modular Scheme, and the Modular Schemes Management, concerned with supporting and maintaining the College's Undergraduate Modular Scheme. The remaining faculty is Learning and Information Services (LIS). LIS provides the majority of generic C&IT skills training to staff and students of the College and also contributes to the undergraduate academic programme.

2.1.5. Academic Year Structure

The academic year is divided into two semesters, each lasting fifteen weeks. An intersemester period of two weeks separates the two semesters and students are encouraged to participate in professional development and further study towards their credit bearing academic work during this time.

⁷ C&GCHE 'The College' <http://www.chelt.ac.uk/college/college.htm> accessed on 14.11.2000

2.1.6. Collaborative Partnerships

The College is committed to ‘developing new partnerships to promote, implement, facilitate and publicise credit transfer and lifelong learning opportunities’⁸. Collaborative partners include various NHS Trusts and Health Authorities, plus several small local colleges. Other collaborative projects include the Gloucestershire Network for Learning (GNfL) which links further education institutions across Gloucestershire⁹ to provide a C&IT infrastructure.

⁸ Opportunity Strategic Plan Volume 2 2000-2005, Teaching, Learning and Assessment Policy including Lifelong Learning, 4.8 p.59

⁹ These are: Cirencester College, Gloscat, Hartpury College, The National Star Centre, Royal Forest of Dean College, Stroud College and Learning Partnership West. For further information see <http://www.gnfl.org.uk/>

3. Current Situation – Overview

3.1. History of Student C&IT Skills Provision

3.1.1. History of Learning and Information Services

The history of LIS influences the structure of the current staff and student C&IT skills training provision. Learning Support Services was established in 1990 integrating libraries, media and support for academic information technology. The focus on supporting student centred flexible learning and the recognition of the importance of information technology in promoting changing styles of learning and teaching contributed to the institutional decision, in 1992, to rename this integrated service 'Information Services' and also to promote it to faculty status. In 1993 computing, media and library resources were physically integrated and located within learning centres for combined delivery of traditional library and IT services¹⁰.

This integrated service facilitated collaboration between information professionals, such as librarians and technical staff, and enabled the creation of new posts, Learning Advisors, who combined both sets of skills. Restructuring in 1998 led to the faculty being renamed Learning and Information Services and the formation of the Department of Learning and Teaching Development. Within this department was located the newly formed Learning Advisory Team which was responsible for most of the generic C&IT skills training for students through the Information Skills Programme (ISP) and for staff C&IT training. In November 2000 this department underwent a further name change to the Department of Learning Technology Support with the Learning Advisory Team renamed as the Learning Technology and Skills Support Team and still retaining responsibility for student and staff C&IT skills training.

3.1.2. History of the Information Skills Programme

A forerunner of the current ISP was established in 1994 with the introduction of free, skills based workshops for students supported by members of the then Information Services faculty. Sessions were divided into **generic software training**, provided by the

¹⁰ Oates and Watson, 'Providing the Institutional Infrastructure to Support Flexible Learning' in Wisker and Brown (Eds.) (1996)

Information Technology specialists based in the *Learning Centres*¹¹, and **Information Skills** which was subject focused and run by the professional librarians. The generic software training comprised three levels of word processing, - basic, intermediate and advanced. Spreadsheet tuition was also offered¹². The librarians provided training in information searching, the C&IT element of which included using CD ROM databases, and on-line databases and electronic resources¹³.

3.1.3. History of Level One Learning and Skills Development Modules

Since the establishment of the Undergraduate Modular Scheme in 1990, all students have

“participated in a skills workshop which has formed a compulsory credit-bearing portion of their Level I programme....This programme has been refined and developed to focus more clearly on transferable skills, employability¹⁴ and learning development¹⁵”.

The programme was implemented in order to provide students with generic and transferable skills and encourage individual, autonomous learners and was largely an attempt to address the need for 'graduateness' in student cohorts.

The 'flagship' module of the programme, WK101, was a compulsory generic skills module which consisted of general skills workshops followed up by meetings with

¹¹ Learning Centres are the result of integrating libraries with computer services, providing an environment for student centred, flexible, resource based learning. Emphasis is also given to the learning support and skills training provided by Faculty staff. Importance is placed upon students' responsibility to manage their own learning and to develop skills that will enable them to be pro-active lifelong learners.

¹² Uptake was initially slow, presumably since students did not regard spreadsheet skills as essential for their studies. Participation rates have since increased as these skills have become more important .

¹³ The ISP has evolved according to staff and student demand and the developing academic profile. For information about how it is currently being provided please refer to the section of this report entitled 'Nature of Provision', section 4.2.1.

¹⁴Employability: a position statement (from Strategic Plan, p.12)

'Consonant with its mission, the College has interpreted the concepts of employability and citizenship widely: as well as the acquisition of skills in information and communications technology, literacy, numeracy and general communication skills, they involve fostering the notions of responsibility, sustainability, and a sense of community.'

¹⁵ Opportunity Strategic Plan Volume 1 2000-2005, Strategic Priority 4, p.19

students' academic counsellors¹⁶ and was part of the credit bearing route taken by level one undergraduates in their first semester of study. Although useful, it was deemed to lack specific subject context and relevance, and student evaluations suggested that the module needed to be more subject focused. Using this evaluative information the module was developed into SF101, part of the *Scheme Field*¹⁷, with a greater emphasis on subject relevance and substantial input by the newly named academic advisors. Specialists, such as the *Skills Development Scheme Leader*, were requested to provide content for individual sessions, supplying students with a general overview of the specific skills needed to complete the module.

3.2. Current Status of Level One Learning and Skills Development Module

3.2.1. Learning Development - SF121

The module went through its latest metamorphosis in 1997 with a new name, *Learning Development*, a new number, SF121, and an even greater focus on 'deep' customisation - skills development relevant to the students' current academic and future professional careers. The module is supported by a centrally produced workbook. The workbook supports activities related to the module and although working through the book has no formal assessment, students are directed to various chapters within it by their academic advisors, depending on the nature of their enquiry¹⁸. The workbook has been customised by the Faculty of Arts and Humanities who use the existing Workbook structure with additions of colour co-ordinated Field Guides, style sheets, description of the role of the academic advisors/support for academic guidance, and a chapter on the development of writing skills with an emphasis on the Humanities subjects.

¹⁶ Academic counsellors (now academic advisors) were members of academic staff who were a first contact point for students needing academic advice extra to that supplied in a normal teaching situation. They have since been renamed academic advisors. They would have, on average, twenty designated students each.

¹⁷ The Scheme Field contains a number of modules which can be used flexibly to contribute to a student's programme of study and award. Modules fall into a number of categories including 'Skills', 'Foundation Studies', 'Supporting Studies for Studying and Learning' and 'Preparatory Studies for Employment and Post-Graduate Study'. There is no award designation for the Scheme Field.

¹⁸ Chapters include: Learning Development & Study Skills, Introduction to Group Skills, Introduction to Communication Skills, Development of Note Taking Skills, Information Literacy, Development of Writing Skills, Time Management and Reflection, Self Assessment and Review.

Customisation was necessary as Humanities staff recognised the diversity of their student population and decided they needed a workbook which would reflect the variety of the Humanities subjects¹⁹.

Distance learning material, including a CD-ROM and information in Portable Delivery Format (PDF), has also been developed for SF121²⁰.

3.2.3. Transferable Skills - SF122

The second part of the *Learning Development* programme has followed a parallel route, going through three changes of name and number: WK102, *Workshop 2*; SF102, *Workshop Studies 2*; and SF122, *Transferable Skills*. The current module, SF122 requires students to complete two 'six week options' and takes place in the semester following successful completion of SF121. Students can choose from over seventy 'options' many of which offer key C&IT skills necessary for the students' progression through their major and minor subject routes in levels two and three. Examples of this will be documented in more detail further in this study. The six week options have been designed to capitalise on student interest and to target specific needs such as numeracy, literacy and C&IT skills development.

Assessment of modules SF121 and SF122 requires, minimally, a word processed essay. Many of the options for SF122 require further C&IT competency including the use of subject specific software and competency with electronic resources for information gathering such as *WebCat*, (the electronic library catalogue) CD ROMs and on-line databases.

3.3. Hardware and Software Provision

The main student computer laboratories are located within the Learning Centres and are linked by a network, 'Metaframe', which connects all three College sites. Students are provided with a login and password which allows them to access the network free of

¹⁹ Humanities subjects for C&GCHE are: English Studies, History, Religious Studies, Theology and Women's Studies

²⁰ The distance learning version of SF121 has been validated for the Certificate of Higher Education in Playwork. Future developments could include allowing campus based students to study using similar methods.

charge and they are allocated eight megabytes of network space for saving their work. This is cleared once a year. An e-mail account is also provided without charge. Students are required to adhere to the College network guidelines of legal, honest and decent use. Consumable items such as floppy disks and printing credits are not free and the College has an electronic 'smart' card system to allow students to manage their Learning Centre finances. LIS are responsible for the maintenance and support of all of these systems and networks.

The two large central computer laboratories in the Park Campus Learning Centre hold approximately sixty networked PC machines each. A smaller computer area, known as the *Flexible Learning Area (FLA)*, contains twenty networked computers and some additional 'stand alone' machines specifically designated for reading CD ROMs. The central PC laboratory at Francis Close Hall Campus houses sixty machines and the smallest Learning Centre at Pittville Campus has thirty one PC compatible machines. The only campus where Apple Mac computers are used is Pittville.

3.4. Publicity

Student C&IT skills provision is advertised in a number of ways, however, the majority of C&IT courses are publicised through new student induction sessions at the beginning of academic courses. The Learning and Information Services Induction Video makes reference to the Information Skills Programme and messages on internal information screens supplement this. A5 sized booklets containing details of ISP workshop contents and timetables for the three campuses are given to all level one students during their LIS induction.

Times of sessions are displayed on an ISP designated notice board located within each Learning Centre where signup sheets are also provided allowing students to choose which ISP sessions they need to attend. Posters advertise the European Computer Driving Licence (ECDL) and members of LIS attend induction sessions to inform students about the different forms of C&IT training available.

Academic modules are publicised via the Undergraduate or Postgraduate Modular Scheme Handbooks. Students can choose modules according to their field requirements and personal interests.

3.5. Learning Materials

Learning materials are provided in a number of different formats, the most common being the paper-based workbooks or 'hand-outs'. The College has its own reprographics unit which can provide multiple copies of paper-based learning materials. Many course materials are written and designed by the module tutors and specific details are given in (no underline)section 4: Nature of Provision, of this report. Newly developed distance learning modules such as *Using the Internet for Learning* (SF126) and *Information Management* (SF122) also incorporate on-line learning material via the educational management system *WebCT* and some modules make use of the Web based conferencing system *WebBoard* to facilitate collaborative learning.

4. Current Situation - Nature of Provision

4.1. Diagram 1 - Opportunities for Student C&IT Skills Provision

Diagram 1 (see PowerPoint file – [The Cheltenham Model](#)) shows the opportunities available for C&IT training throughout a student's academic career. This includes voluntary and compulsory skills training, degree credit bearing modules, external certification awards and non-credit bearing workshops. The diagram is first divided into two categories: *Programme or subject specific C&IT training*, the completion of which contributes to a student's degree programme and is therefore only available to students enrolled upon specific academic routes; and *Generic C&IT skills training*, available to all students irrespective of course and primarily available as generic skills underpinning. These categories are further divided into voluntary and compulsory courses and modules. The level at which each type of provision exists is mapped horizontally. Each of the courses and modules included on the diagram are examined in detail in the next part of this case study.

4.2. Voluntary Non-Credit Bearing Generic C&IT Skills Training

4.2.1. Information Skills Programme

The Information Skills Programme provides generic C&IT skills training for all C&GCHE students irrespective of their course and level. Some students had little formal opportunity to learn the C&IT skills necessary to complete their studies and to include with their other transferable skills, hence the establishment of a central C&IT training programme which can be customised by the individual student according to their C&IT training needs. The current model evolved from the original skills sessions first offered to students by Information Services in 1994/5, however, extra subjects, sessions and learning materials have been introduced commensurate with demand from students, tutors and the increasing technological society²¹. Training is delivered by members from the Department of Learning Technology Support who are also

²¹ Examples of this demand include information retrieval skills using electronic resources such as the World Wide Web and electronic/on-line databases, word processing skills for the creation, editing and formal presentation of assignments, dissertations and theses, and presentation skills for the imparting of knowledge, facts and information.

responsible for the development of the learning materials and the evaluation of the programme.

The ISP comprises individual one or two-hour training workshops covering a variety of subjects²². Although most students find one session adequate for their training needs, they are able to attend the same session more than once if necessary. Sessions are timetabled during both semesters to accommodate students who need time to identify personal skills gaps and training needs. A few students begin their course of study during the second semester and therefore require the same training opportunities as those offered to the earlier intake. Attendance at ISP workshops is voluntary and is not currently awarded with any recognised credit or certification. All sessions and associated learning materials are free of charge. Previous page no missing

At the Park Campus, up to fifteen students can be accommodated in any one session, in a training room designated for student and staff C&IT skills training. Training is provided across all three campuses, although on the two other campuses, no designated training room is available and sessions take place on a nominated cluster of laboratory machines. The sessions run from weeks one to eight in the first semester and weeks one to six in the second semester. General 'drop-in' sessions are also run later in the semesters. These are advertised as an opportunity for students to request specific skills training, often 'troubleshooting' existing C&IT problems. During the first semester of the academic year 2000/01, 690 training places were offered at the Park Campus and 64 at each of the other campuses making a total of 818 training places, however, figures indicate that only half of these places were attended with a higher percentage of students using the Park Campus sessions.

Training is delivered in a variety of ways. The length of the sessions depends on the nature of the subject; for example advanced courses tend to be shorter because less information is covered. The most usual method of delivery is for the trainer to demonstrate and explain the skills to be learned by projecting an image of their own computer display onto a large wall mounted screen via a video projector or interactive

²² Basic Introduction to Computing, Word Processing (Basic and Intermediate), Using Word for Large Documents, Spreadsheets, Power Point (Basic, Intermediate and Advanced), Searching the World Wide Web for Academic Resources, Electronic Information Resources for Academic Purposes, Introduction to the College's Intranet and Using E-mail. All software refers to Microsoft Office 2000. The E-mail system used is Microsoft Outlook.

whiteboard. Students are given a workbook containing tasks to complete²³. The trainer uses this workbook to demonstrate skills and explain the tasks which the students then spend ten minutes trying for themselves. Approximately fifteen minutes is built into the end of each session to allow students to ask further questions and to practice the newly acquired skills. ISP workbooks can be provided to students to work through independently, however, the Learning Technology and Skills Support Team place a high value on the support given by the tutor and believe this contact is an important element of the ISP skills training. It is recognised that the mechanistic nature of C&IT skills make them suitable for on-line delivery and it is intended that some of the tuition provided by the ISP will soon be available, and delivered, on-line. The materials and teaching methods used for the ISP are currently being evaluated for their suitability for conversion to on-line learning material. It is likely that some new resources will have to be developed and some commercially produced independent learning material, such as that used for the ECDL (see section 4.7.2), purchased²⁴.

The training provided is regularly evaluated and reviewed and the programme is refined to accommodate any recommended changes. Comments range from praise of the helpful staff and usefulness of the learning materials to criticisms of speed of delivery and relevance of content to academic study. Overall, students generally perceive the ISP as both necessary and helpful.

4.3. Compulsory Credit Bearing Level One Skills Modules

4.3.1. Learning Development - SF121

As mentioned in section 3.2.1 of this report the SF121 module aims to develop transferable skills in level one undergraduate students and is customised by faculties to provide subject focus. The example used here will be that of the Faculty of Arts and Humanities.

²³ Examples of learning materials can be provided upon request.

²⁴ An apparent contradiction appears between the importance placed on tutor support and the development of self teach material, however, this can be justified in that the diverse range of learning styles possessed by students necessitates a mixed provision of both tutor led and self-teach skills provision.

The Humanities Workshop Module Timetable shows C&IT training sessions which are a collaboration between A&H and LIS faculty staff. The first session, *Use of CD ROMs/electronic resources* is provided by LIS staff and is delivered by a lecture in the computer laboratories explaining how and why these resources should be used. Members of the Schools of History and English Studies support the second, *word processing sessions*, which also take place in the computer laboratories. A simple instruction sheet is used to guide students through basic word processor functions and reference is also made to the Information Literacy chapter of the Humanities Workbook²⁵. The module assessment requires students to demonstrate their ability to complete various C&IT activities²⁶.

SF121 is regularly evaluated and revised and future developments for Humanities students include introducing more on-line resources such as searching/evaluating Web resources, using Web based databases, on-line journals and Web based tutorials²⁷.

4.3.2. Transferable Skills - SF122

This is the second of the compulsory level one Learning Development modules and runs in the second semester. Students choose from over seventy ‘options’ of which thirteen²⁸ have been identified as having a large C&IT content. Some of these modules have multiple runs and are also repeated twice over the semester, giving numerous opportunities for the students to participate in a C&IT oriented module. Each option lasts for six weeks and students choose two different courses to be taken during the semester. Unless otherwise stated below, students may choose any of the options offered. Contact time and delivery modes vary depending on the nature of the course,

²⁵ Please refer to section 3.2.1 which contains further information about the customisation of the Humanities Workbook.

²⁶ Formatting an essay appropriately – size of font, line spacing, paragraphing etc., Underlining of titles, Indentation and spacing of long quotes, Use of spell-check function, Use of footnotes and bibliography for appropriate referencing.

²⁷ Such as the JTAP project ‘Virtual Seminars for Teaching English Literature’.

²⁸ Titles include: Computing for the Social Sciences, Information Management, Computer Aided Design, Data Handling in Sport, Serious Fun with Text and Pictures, Gentle Mathematics for Computing, Computing for the Absolute Beginner, Web Pages for Beginners, Investing in UK Shares, Making sense of Environmental Data, Gentle Statistics with Excel, Microsoft Access for the Absolute Beginner and Creating Active Web Pages. These titles are taken from the 1999/2000 options as the current 2000/01 options are not available at the time of writing.

however most options use a standard two hour weekly contact model, totalling approximately twelve hours contact time between tutor and student for each 'six week option'. This can be further divided into traditional lecture/seminar tuition and computer laboratory tuition depending on the nature of the course.

For the purposes of this case study three options will be briefly considered: *Information Management* (WA3 & WZ3), *Data Handling in Sport* (WA10, WZ10, WZ11 & WZ12) and *Serious Fun with Text and Pictures* (WA43 & WZ48).

4.3.3. Information Management - WA3 & WZ3

The *Information Management* option builds on the Information Skills element of the SF121 *Skills Development* module and includes using electronic databases and the Internet for information gathering as its main C&IT component. The option is run by staff based in the Department of Learning Technology Support. *WebCT* is used to encourage participation in C&IT, to facilitate communication and collaborative learning among students and to provide experience of the benefits of working within a virtual learning environment. Up to thirty students can be recruited per six week block, accommodating a possible sixty students per year; however, typical enrolment numbers are usually half this number.

4.3.4. Data Handling in Sport - WA10, WZ10, WZ11 & WZ12

Data Handling in Sport is compulsory for students taking a fixed route in Sports Science and is prerequisite for further Sports Science. It aims to 'enable students to increase their understanding of numerical and graphical methods of data handling'²⁹ and involves using 'computer packages to tabulate data and produce graphs'³⁰. The option has to cater for up to two hundred students per year, hence the need for four option runs. Students are assessed using the computer aided assessment tool *QuestionMark Perception*, which further develops their C&IT competence and experience. The module is run by staff from the Faculty of Environment and Leisure.

²⁹ C&GCHE, SF 122 Transferable Skills six week option descriptors

³⁰ Ibid

4.3.5. Serious Fun with Text and Pictures - WA43 & WZ48

Serious Fun with Text and Pictures concentrates on an 'integrated approach to using word processing and spreadsheet packages'³¹ in a professional/business context. Students are supported in the use of *MS Word*, *MS Excel*, *CorelDraw* and some *WordArt* packages. They are also introduced to using a scanner. The programme keeps pace with the technology available and therefore reflects developments in the professional arena. The course recruits an average of between twenty and twenty five students in each run and there are typically two runs per year.

4.4. Voluntary Credit Bearing Generic C&IT Skills Training

4.4.1. Scheme Field modules - SF126 and 206

Using the Internet for Learning is a level one undergraduate module, run by the Department of Learning Technology Support and delivered entirely on-line through *WebCT* although a video has been produced to support the teaching and learning methods employed within the module. Skills training in the module includes use of electronic academic resources³² to support independent study. Although the module has currently attracted a small number of students, numbers are predicted to increase commensurate with the growing C&IT proficient student population and the need for flexibility within module delivery.

Information Skills for Independent Learning is a level two undergraduate module, again run by the Department of Learning Technology Support. It aims to develop advanced information and literature searching skills in the context of the information society. Drawing heavily on electronic academic resources, one of the module's aims is to provide students with the ability to 'critically assess available information technologies and demonstrate how they can be used to support learning'³³. Delivery method comprises taught, tutor led classes combined with the use of *WebCT*.

³¹Ibid

³² Including, for example, e-mail, the World Wide Web, bibliographic databases and on-line library catalogues.

³³SF 206, Information Skills for Independent Learning, course outline

4.5. Voluntary Credit Bearing Subject Focused C&IT Skills Training

4.5.1. Computing for Leisure, Tourism and Hospitality - HM101

Computing for Leisure, Tourism and Hospitality is run by the Faculty of Environment and Leisure primarily for Hotel Management students. It teaches the relevant C&IT skills³⁴ for 'maintaining efficiency' in a professional environment and accessing 'sector related resources on the Internet/World Wide Web'³⁵. The module is recommended to those students who need to learn or improve their generic C&IT skills in this professional sector but cannot be taken in conjunction with the equivalent Business Technology module, BT101, (see below) as the skills gained from both modules are considered to be extremely similar.

The module runs over both semesters and is popular, recruiting approximately two hundred students in the 1999/00 academic year and one hundred and twenty five students in the 2000/01 session. Training and support is provided in a variety of ways combining taught workshops with independent study. Students are encouraged to purchase College produced independent learning guides for *MS Word* and *MS Excel* and must also spend time developing skills using on-line and electronic resources.

4.6. Compulsory Credit Bearing Subject Focused C&IT Skills Training

4.6.1. Information Technology - BT101

Information Technology is the compulsory module offered in the field of Business Information Technology by the Gloucestershire Business School. This module is an important introduction to *MS Excel* and *MS Access* as used in a professional business context³⁶. It runs in the first semester because the skills it provides are considered essential for both future BT modules and the students' industrial placement and work

³⁴Namely transferring data including graphics, using Mailmerge and look-up tables, moving files and preparing tables and charts.

³⁵C&GCHE, Undergraduate Modular Scheme Handbook 2000-2001, p133

³⁶ The module previously included training for word processing, however, that need has diminished in recent years, owing to students possessing a greater number of C&IT skills before entry onto the course.

experience. BT101 is compulsory for students studying on a number of programmes³⁷ and therefore recruits approximately six hundred students each academic year. An additional run of the module takes place in the second semester and is offered to late entrants, students who have changed fields and students who failed the module in the first semester and need to retake. The module is also franchised to collaborative partnership colleges who use C&GCHE's model of study and assessment and may support up to ten additional students annually. Taking these extra student numbers into account means overall student enrolment totals nearly seven hundred per academic year. Training is provided through hour long, tutor led lectures to approximately one hundred and eighty students, followed by two-hour practical sessions in the computer labs with up to sixty students in each group. GBS aim to supply three trained members of staff - usually a combination of lecturers with postgraduate students - to support each practical session and one technician to deal with technical problems and queries. Training materials are developed by faculty staff and mainly comprise explanatory workbooks. The faculty chose to buy external training material for *MS Access* in the 2000/01 academic session as the College wide move to *MS Office 2000* software in October 2000 meant all of the existing learning materials needed to be upgraded. The faculty will, however, be creating their own material for the academic year 2001/02. The course leader is also investigating the option of developing on-line material to support the course but as yet no decision has been made about this.

4.6.2. Fine Art and Professional Media - FA211 and PM 217

The Faculty of Arts and Humanities have their own information technology lecturer who teaches C&IT skills within a professional business context³⁸. Compulsory modules offering a significant degree of C&IT skills provision include *Matrix A & B* (FA211) and *Professional Studies* (PM217) from the Schools of Fine Art and Professional Media

³⁷ Degree in Business Technology (BT), HND and HNC in Business Technology, HNC and HND Information Systems, HND Business Management, HND Human Resource Management, HNC and HND Multimedia Information Technology, HND Accountancy and Financial Management, HND Financial Services Management, HNC and HND Information Technology and HND Marketing Management.

³⁸ Skills taught include word processing, using spreadsheets and basic HTML code.

respectively³⁹ in which students are encouraged to apply C&IT skills in simulated workplace situations such as designing invoices, using spreadsheets to calculate wages and other costs, importing images into CVs, creating advertising materials for a company and self promotion on the Internet.

4.6.3. Bachelor of Education and Post Graduate Certificate of Education (Primary)

The Faculty of Education and Social Sciences is responsible for primary and secondary education based courses⁴⁰. Following the Government circular 4/98 requiring the ‘use of information and communications technology in subject teaching for all courses of initial teacher training’⁴¹, C&IT training is regarded as extremely important and necessary to help education students achieve the Teacher Training Agency (TTA) requirements and exit standards. The TTA states that:

"ICT is now an integral part of the initial teacher training National Curriculum. The curriculum aims, in particular, to equip every newly qualified teacher with the knowledge, skills and understanding to make sound decisions about when, when not, and how to use ICT effectively in their subject teaching. The TTA has also produced exemplification material to relate the curriculum to each subject in both phases"⁴².

Training is provided by staff from the School of Education combining taught classes with independent learning and utilising paper based and electronic resources. The BEd students are required to take three C&IT based modules spread over the duration of their course while the PGCE Primary students have to complete this training within one

³⁹ These modules are only compulsory for a defined route and therefore not compulsory for every Arts student.

⁴⁰ Bachelor of Education (BEd), Post Graduate Certificate of Education (Primary) (PGCE Primary) and Post Graduate Certificate of Education (Secondary) (PGCE Secondary). Although PGCE Secondary students also need to conform to the government C&IT requirements, attendance of C&IT training sessions is not compulsory. Voluntary training is provided as a collaboration between staff from the PGCE Secondary course and members of the Department of Learning Technology Support using a model similar to the ISP and allowing students to choose training sessions appropriate to their needs. C&IT skills support is also provided by the subject co-ordinators – the school based teachers responsible for supporting the trainees’ subject, and professional development.

⁴¹ http://www.dfes.gov.uk/circulars/4_98/sumreq.htm

⁴² <http://www.canteach.gov.uk/info/ict/index.htm>

year and are provided with an intensive three day C&IT induction period at the beginning of their course of study⁴³. Attendance on C&IT skills training courses and modules is compulsory for BEd and PGCE Primary students.

The BEd course recruits approximately three hundred and twenty students for each intake while the PGCE Primary figures are lower, recruiting 90 students for the 1998/99 academic session and 120 for the 1999/00 academic year. C&IT skills training is located in either of two designated areas; the main computing laboratories or a smaller Educational Computing Room (ECR), specifically equipped to support education based C&IT programmes and software such as interactive CD ROMs and other software used in schools. The ECR is only available to students enrolled upon an education course and accommodates approximately twenty five students.

All education students are encouraged to participate in the CLAIT and ECDL programmes (as documented in section 4.7) since these qualifications can be used in student portfolios as evidence documenting their achievement of the 4/98 requirement.

4.7. Voluntary Externally Certified Awards

4.7.1. Computer Literacy and Information Technology - CLAIT

The College supports the Computer Literacy and Information Technology (CLAIT) qualification which is run by the Oxford, Cambridge and RSA Exams Board (OCR). OCR supply the exam papers and set the standard to be achieved for successful completion although testing, in appropriate examination conditions, and training support are provided by the College IT Training Officer and members of the Learning Technology and Skills Support Team. Growing student numbers indicate that CLAIT is regarded as a useful programme of study; the 1998/99 academic year saw thirty seven students enrol, the following year numbers grew to fifty four and this academic year LIS is supporting sixty four students.

CLAIT is offered as a stand alone C&IT skills programme and is partially funded by the students themselves. Training is provided through an independent learning workbook,

⁴³ This induction covers generic C&IT skills such as word processing, spreadsheets and presentation software such as Power Point. Students are also asked to design and deliver a Power Point demonstration using a computer and video projection equipment.

complete with sample tests, which the students are expected to complete in their own time. The workbook was originally produced by staff from Learning and Information Services as distance learning support material for Playworkers. The training material covers word processing, databases, spreadsheets and graphical representation of data and adheres to the CLAIT syllabus.

4.7.2. European Computer Driving Licence - ECDL

C&GCHE is a registered European Computer Driving Licence (ECDL) test centre. ECDL is available to students and although initial take up has been slow, recruiting one student in 1999/00 and seven students in 2000/01, numbers are expected to increase as the qualification becomes more widely recognised. Although, currently, students partially fund the qualification themselves, the introduction of the government's Individual Learning Accounts will considerably reduce a student's monetary contribution to the award and this is also expected to encourage participation. Once enrolled, students may take up to three years to complete the seven units that make up the qualification and entitle them to an ECDL 'passport' which is a recognised qualification throughout Europe. Testing takes place at a pre-arranged testing session.

Training is provided in two ways. Interactive on-line training material has been purchased from a Swedish Company, M2S, using their Windows Interactive Training (WIT) on-line software and alternative training material, purchased from Cheltenham Computer Training, is available to read, download or print from C&GCHE's intranet. Testing is at a pre-arranged testing session organised and administered by the College's IT Training Officer. The course is linked to the ECDL Foundation and the British Computer Society who oversee the running of the qualification in this country.

4.8. Additional Support Mechanisms

4.8.1. Senior Information Advisors

Members of the Faculty of Learning and Information Services (Learning Centres Department) also provide students with tailored C&IT training. The Senior Information

Advisors⁴⁴ (SIAs) provide short information sessions instructing students on the use of electronic information resources such as CD ROMs, on-line databases and using the Internet to access and locate appropriate academic resources. These training sessions, arranged between module tutors and SIAs, are subject specific and normally timetabled as a single session within a larger curriculum framework with the emphasis placed upon the module tutor to ensure all students have the opportunity of attending at least one session. Training usually takes the form of a short introductory explanation about how the resources work and why they should be used, followed by a practical 'hands-on' workshop in the computer labs. SIAs often produce a written handout or workbook to support the session, suggesting useful tasks for the students to perform in order to explore the resources.

4.8.2. Postgraduate and Research Students

Postgraduate students receive a newsletter three times a year detailing workshops and C&IT skills training sessions. The workshops are offered as a collaboration between staff from LIS and the College's Graduate School and introduce more advanced skills required by postgraduates⁴⁵. Sessions are delivered in the staff/student C&IT training room, using a combination of explanation, demonstration and 'hands-on' experience. These workshops take place approximately three times per academic year and are timetabled for evenings, weekends and the inter-semester period since many postgraduates study part-time and have other daytime commitments. There is also a *WebCT* course specifically designed to support postgraduate learning and information needs, onto which all registered postgraduate and research students are enrolled.

Additional C&IT skills training is provided for students enrolled on postgraduate management courses as they are required to be familiar with spreadsheets, databases and statistical packages such as *MS Excel*, *Compel* and *SPSS* to 'analyse and interpret data so as to enable management decisions using appropriate graphical and statistical techniques'⁴⁶. Training is provided by the module tutor using a combination of taught classes, self teach materials and on-line resources.

⁴⁴ Subject Librarians

⁴⁵ Advanced skills include: preparation for large documents such as dissertations and theses, using the Internet as a research tool, introduction to NUD*IST (qualitative research tool), introduction to SPSS (statistics package), Word for large documents, Power Point and Authoring web pages.

⁴⁶ Learning outcome 5 as stated on 'IPD Core Management: Managing Information – Module outline'

Research students are able to attend the College staff training programme⁴⁷. This includes training in generic software packages, support for CLAIT and ECDL and other electronic information searching and gathering skills. Formal training is also provided for research students and members of staff in *SPSS* and *NUD*IST* software. This takes the form of day long workshops led by specialist staff from various College faculties and explores the software at a deeper level than the postgraduate introductory sessions.

⁴⁷ Sample timetable available at <http://intranet.chelt.ac.uk/lis/lts/ltsst/staff/timetable.htm>

5. Current Strategy and Policy

At a strategic level C&IT skills provision is considered important with access to networked computers regarded as a key factor for a range of learning activities, hence the LIS strategic target of increasing computer/student ratios from 1:15 to 1:6⁴⁸. The use of specialist learning software including *WebBoard*, *WebCT* and *Questionmark Perception* has been (italicise) encouraged. Initially each academic faculty helped develop two *WebCT* modules in collaboration with LIS staff; significantly, the number of *WebCT* courses has risen from eight to sixty in just eighteen months. The new College intranet has also been identified as an important framework on which a variety of learning materials and information can be placed and as the intranet develops, training will be made a priority. The College remains committed to supporting and developing its existing educational software with expansion of electronic resources including video projection units and 'smart' white boards planned for the future.

Staff training is also considered to be fundamental in establishing a strong C&IT infrastructure as well as building a foundation for future skills development. The College encourages staff to become involved in good practice dissemination programmes⁴⁹ and to address issues and guidelines suggested by the Learning and Teaching Support Network (LTSN) subject centres. C&IT use is also actively encouraged in teaching since students are more likely to respond to a good example and positive experience of C&IT. Targets and policies relating to this practice are documented in sections 5.2, 5.3 and 5.6, below.

5.1. Institutional Responsibility for Student C&IT Induction

A wide range of College committees and groups are, in part, concerned with student C&IT induction. The ICT Steering Group considers the C&IT strategy for the whole institution; the Teaching, Learning and Assessment Committee is concerned with how C&IT is used, applied and integrated within learning activities; the Undergraduate

⁴⁸ Faculty of Learning and Information Services Strategic Plan 1999-2004, section 2.1 Learning and Teaching; Resources and ICT equipment

⁴⁹ Such as the internal Seminars of Learning and Teaching (SoLT) programme and external JISC and HEFCE initiatives

Modular Scheme owns the SF121/122 student skills programme⁵⁰ and the Postgraduate Modular Scheme requires an overview of skills development at postgraduate level.

Other bodies interested in C&IT skills provision include the Faculty Academic Standards Committees (FASCs), which ultimately approve changes to existing modules and new module additions and must adhere to quality assurance (QA) issues with regards to module skills provision; Field Boards annually evaluate modules and are subject to internal and external validation which requires adherence to QA standards; and the LIS Faculty Management Team which plans changes for the future, receives and actions feedback from Field Boards and recommends good practice, thus facilitating an iterative process.

C&IT elements are incorporated into a range of strategic documents summarised by the following key points:

5.2. ICT Development

The College is committed to C&IT development and in its strategic priority⁵¹ states;

"The College has made significant investment in its Information and Communications Technology (ICT) infrastructure [both] to support teaching and learning, ... As well as ensuring that students acquire appropriate ICT skills as part of their academic programmes, teaching and learning developments have included the production of multi-media learning materials on CD ROM."

The College has set targets with regard to C&IT, including endeavouring to:

- Use ICT to support effective teaching and learning by developing learning materials on CD ROM and the Web, and by making these resources available to support distance learning;
- Encourage staff use of ICT to support scholarship and intellectual exchange across a wider academic community by supporting the use of e-mail, mailing lists, and discussion groups;

⁵⁰ Although this generic programme is customised depending on faculty, these faculties are still required to have input into SF121 and 122 skills provision

⁵¹ Opportunity Strategic Plan Volume 1 2000-2005, Strategic Plan number 7: The exploitation of new information and communication technologies in both management and educational contexts.

- Ensure that all of its major ICT systems are robust and resilient⁵²

5.3. Information and Communication Technology Policy

The College has an information and communication technology policy which provides a 'set of standards and procedures to support the procurement and development of ICT systems'⁵³. This includes reference to staff C&IT training. Through the Staff Training Officer, Learning and Information Services provide introductory and intermediate level training courses in College approved software applications. Support can also be offered individually in a training session lasting up to one and a half hours. This is limited to one per person per year and is available to research students.

5.4. Teaching, Learning and Assessment Policy Including Lifelong Learning

The aim of this policy is to develop and underpin institutional culture and practice in order to promote lifelong learning and the continuous improvement of the student learning experience. In doing so, the College seeks to promote its students' skills for lifelong learning and employability through the appropriate use of Information and Communications Technology⁵⁴. As part of this policy the College seeks to ensure that all students are properly inducted and have appropriate access to the College information and communications technology infrastructure and resources for on-line learning.

5.5. Information and Communications Technology for Teaching, Learning and Assessment

This part of the Teaching, Learning and Assessment Policy aims to develop the learning and teaching environment through the appropriate use of C&IT. It is committed to ensuring a coherent and structured approach to the continued development and use of

⁵² Ibid

⁵³ Opportunity Strategic Plan Volume 2 2000-2005, Information Strategy, Current Issues, p.32

⁵⁴ Opportunity Strategic Plan Volume 2 2000-2005 p. 58-59

educational technology, which enhances communication, improves access to resources and information, and provides software tools. Priorities include improving the technological infrastructure and information resources for staff and students, developing in all users a sound understanding of the range of electronic technologies available for communication, on-line course delivery and assessment, including WWW, e-mail, electronic conferencing and electronic learning resources. It also aims to ensure sound understanding by students and staff of the effective use of C&IT to support learning, teaching and assessment and to promote more flexible and responsive approaches to the use of learning time and to encourage innovative use and evaluation of C&IT resources to develop learning, teaching and assessment⁵⁵.

The College's Centre for Learning and Teaching (CLT), through the Teaching, Learning and Assessment Committee, has also developed a Forward Plan for Quality Enhancement which includes a staff C&IT development strand.

5.6. Information Strategy

The College's information strategy lists among its current issues the need for the use of C&IT to support learning, teaching, assessment, and research: and the development of staff who are information literate and C&IT capable⁵⁶.

5.7. Information Systems Policy

The information systems policy has been developed to use C&IT to reduce costs, enhance services, and provide management information to support development of the learning, teaching, research, administration, and management processes of the institution.

⁵⁵ Opportunity Strategic Plan Volume Two, Information Strategy, Current Issues, p.62

⁵⁶ Opportunity Strategic Plan Volume 2 2000-2005, Information Strategy, Current Issues, p.31

6. Emerging Directions

6.1. On-Line Course Delivery

The most important trend to emerge from this case study is the development of on-line learning and course delivery. It is likely that C&GCHE will see more modules, or parts of modules, delivered using appropriate on-line methods. Training currently delivered using traditional methods will be adapted for on-line delivery. The surge of interest in educational software and its perceived educational benefits, such as students 'working as effective communities, ... negotiating agreements and problem solving'⁵⁷, indicate that on-line learning will play an increasingly important role in the academic environment.

6.2. Changing Student Skills Base

The changing student profile may result in the inclusion of more advanced and technically demanding C&IT training sessions. Students are arriving with more C&IT experience and knowledge, as suggested by reduced attendance of basic word processing ISP courses and the omitting of word processing in BT101 (section 4.6.1). The training offered, therefore, will need to reflect this change. Continuous evaluation will address this issue as it arises.

Also significant is the changing student community. The government commitment to increase participation and widen access⁵⁸ means that students who have traditionally been under-represented in HE are now remaining in education. This greater diversity in the student population eliminates the idea of the 'average learner' and tutors face the prospect of educating a twenty-first century audience possessing a multitude of learning styles.

⁵⁷ Skinner, Elisabeth, (2000) Using the Web to Widen Access, *Journal of Learning and Teaching*, 6 (1) p.10. Article documenting experience of using WebCT to support a Local Policy module at C&GCHE

⁵⁸ Higher Education for the 21st Century: Increasing Participation and Widening Access, accessed from <http://www.lifelonglearning.co.uk/dearing/dr1000.htm>

6.3. Generic C&IT Skills Programme

The value of an established C&IT skills provision programme indicates that the ISP will perform an increasingly important role in supplying students with generic C&IT skills. The flexibility of the current model is also likely to develop, with additional evening and weekend sessions allowing equal attendance opportunities for students. Possible future directions include the incorporation of an ISP model into the Learning Development Programme or even the introduction of recognised credit for students participating in skills training sessions.

6.4. Incorporation of Subject Specific Software into Generic Skills Programmes

A further development may be the inclusion of additional software such as *Photoshop*, and the use of Web editors for Webpage construction, into a generic C&IT skills training programme. As these previously specialist software packages grow in popularity and become more commonly used in academic and professional environments, benefit will be gained from incorporating them into a generic skills training programme. Influencing factors for C&GCHE may include College policy regarding the use of approved generic software.

6.5. Changing Emphasis of Educational Software on Educational Practices

Areas of recent change include the wider use of Web conferencing facilities. The importance of collaborative learning is now recognised and many of the modules and courses using on-line conferencing facilities encourage their students to participate in on-line discussions and debates about various aspects of their academic courses. This growing trend will necessitate more training in both the technical and educational use of on-line discussion tools for staff and students of the College.

6.6. Use of C&IT to Demonstrate 'Graduateness'

The notion of 'graduateness' deserves serious attention and there is pressure on graduates from employers to prove their transferable skills. The College recognises this and identifies and defines skills in module descriptors, indeed, the Teaching, Learning and Assessment Policy mentioned in section 5.4 seeks to promote students' skills for lifelong learning and employability.

A project is currently being undertaken at C&GCHE to explore how students can profile their skills development and participate in career management through the compilation of a professional development portfolio or 'personal profile'⁵⁹. C&IT fulfils two functions here; first, C&IT skills are transferable in nature and useful to an employer and second, C&IT can be used as a medium to produce and maintain a development portfolio suitable for professional reflection *and* personal skills promotion or presentation to potential employers. An emerging direction, therefore, is the emphasis on the transferable nature of C&IT skills, needed for future employers, personal and professional development and lifelong learning.

6.7. Compulsory/Certified C&IT Skills Training

The importance placed on skills acquisition, as reinforced by the strategic documents quoted in section 5, may necessitate the introduction of compulsory C&IT skills training which would provide students with relevant certification. This could then also be used as supportive material in a professional development portfolio. Should this direction be pursued the ECDL could emerge as one appropriate qualification as it has the capacity to support a large number of students owing to on-line training material and assessment.

⁵⁹ Project title 'Student Personal Profiling and Career Development' led by Margaret E. Harrison as part of C&GCHE's Scholarship of Learning and Teaching (SoLT) programme. It is expected this will be developed as a compulsory element of all undergraduate courses within the next two years. Also see the employability position statement in section 3.1.3

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8. Appendices

- For the Cheltenham Model of C&IT provision see the attached PowerPoint file.
- For a model of the IS Management Structure see attached PowerPoint file.
- SF121 Learning Development ([sf121.pdf](#))

See the activity list.

http://www.visual-arts.infomen.co.uk/visual-arts/VA_SF121.htm