

UNIVERSITY OF
NEWCASTLE UPON TYNE



Introduction to Health Informatics for Specialist Registrars Newcastle Site Evaluation Report & Recommendations

**The Sowerby Centre for Health Informatics (SCHIN)
School of Health Sciences**



Final Report

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The above surprisingly long, yet incomplete, list clearly demonstrates the large number of people it takes to make even a short 6 day course successful.

Reference

2. Executive Summary

Scope

Report on a pilot course in Health Informatics (HI) run at Newcastle medical school and present recommendations.

Pilot Course Format: 6 full days over three months

Learners: 30 specialist registrars in total, from Anaesthetics, Geriatrics, Paediatrics, General surgery, Hospital dentistry and Rheumatology. Equal mix of males / females.

Data collection techniques: pre-course needs assessment, evaluation questionnaire and workshop.

Major Findings

Needs assessment questionnaire (before course)

See needs assessment report

71% had a computer at home.

HI knowledge and skills were at a low level.

The most common reasons for attending the course were to learn about data collection, analysis and retrieval (80%), developing databases and improving research / presentation skills.

Evaluation questionnaire (after course)

Only statistically significant findings are presented in this sub section

Aggregating responses respondents were willing to pay personally approximately one tenth of the actual cost of the present course or a future follow on course.

The course was rated to be invaluable by respondents for when they become consultants.

Four fifth of respondents felt they had significantly / vastly increased their HI skills and knowledge.

Changing the format to 12 evening sessions was considered to be unacceptable.

Changing the format to that of an open learning course was considered to be unacceptable .

Technological support of some kind was considered not to be a suitable substitute for some face to face contact.

Access to a computer was considered to be necessary / essential for the course.

Development of news-groups, bulletin boards or a web site were not considered to be desirable by a larger proportion of respondents

Possession of a laptop was considered to be desirable by a larger proportion of respondents.

More emphasis on self learning techniques or site visits were considered not to be desirable by a larger proportion of respondents while two methods (personal tutorials and small groups) of increasing face to face contact were.

For the present course respondents expressed a desire for more SPSS, statistics, systems design & information management techniques, word-processing, Excel and Internet education.

Anecdotal evidence	<p>For a follow on course respondents expressed a decreasing desire for, education in QBE (and SQL less so), specifying + developing databases, computerised audit, presenting data graphically, the Internet, specifying requirements and liaising with the IM&T department. The least popular topic areas were decision support, computers in the consultation and coding, classifications.</p> <p>A larger proportion of respondents felt that it was irrelevant if the course leader was medically qualified.</p> <p>Both Workshops run by local clinicians (HIS and clinical systems) and the doctor / patient / computer workshop were considered to be useful / invaluable.</p> <p>Evaluation Workshop</p> <p>Learners felt unrealistic expectations were being placed on them from colleagues and line managers, after the course.</p> <p>The wide range of prior computing skills exhibited by those on the course was considered to be a problem by learners.</p>
<p>Recommendations</p>	
<p>Local Level</p>	
Recommendation 1	<p>It is essential to develop close links with all stakeholders who may have an interest in any prospective course.</p>
Recommendation 2	<p>Approved HI education should be considered as being suitable for study / research leave.</p>
Recommendation 3	<p>Local mechanisms of accreditation for any planned courses should be investigated.</p>
Recommendation 4	<p>Preliminary basic IT skills / knowledge courses should be offered to those who may require them before any HI education commences.</p>
Recommendation 5	<p>Basic HI training should consist of approximately an equal split between HI computer skills development and theory.</p>
Recommendation 6	<p>Course material developed for basic HI training should be assumed to have a short (i.e. one year) life span.</p>
Recommendation 7	<p>Course material developed for Basic HI training for SpRs should provide specialty specific clinically relevant examples.</p>
Recommendation 8	<p>Course material developed for Basic HI training for SpRs should contain local IM&T managers preferences wherever possible. These should be presented in an analytical light.</p>

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Recommendation 9	Course material should be produced using the most economic method, which optimises dissemination and minimises the costs of maintenance, management and redundancy.
Unnumbered Recommendation	Careful consideration should be given to Method(s) of course delivery.
Recommendation 10	<p>When considering funding of basic HI education for SpRs the following three alternative approaches should be examined:</p> <p style="padding-left: 40px;">Ad hoc external training consultancy (individual or group level)</p> <p style="padding-left: 40px;">Facilities management by an external agency or internal department</p> <p style="padding-left: 40px;">In house delivery</p> <p>The choice of which particular approach an institution chooses should not only be based upon numbers of students and infrastructure considerations but national recommendations regarding SpR training.</p>
Recommendation 11	The exact status of HI teaching should be specified in the relevant faculty /departmental business plans.
Recommendation 12	When considering basic HI education for SpRs the possibility of organisational restructuring should be considered with the specific aim to produce the most cost effective and acceptable solution.
Recommendation 13	Appropriate individuals / resources in other departments should be sought out and utilised where ever possible.
Recommendation 14	The organisational position of any Health Informatics activities should be carefully planned and frequently reviewed at a high level in the organisation.
Recommendation 15	Any additional IT (software and hardware) requirements must be carefully considered for any proposed course including support overheads.
Recommendation 16	Appropriate numbers of suitably knowledgeable educators must be available for practical sessions in suitably equipped rooms.
Recommendation 17	Discussions with the library should commence early in the planning stage.

National Level

- Recommendation 18 The status and broad aims of HI training for SpRs needs to be clarified by the appropriate national bodies. These outcomes should be disseminated widely.
- Recommendation 19 A national forum should be set up to develop a set of robust and educationally credible syllabi. The syllabi should attempt to map to other groups who have HI training needs (managers, nurses, technicians etc.) by forging links with the necessary groups. Educational curriculum development expertise should be obtained to manage this process.
- Recommendation 20 Any Planned course should be developed in a modularised manner to facilitate credit accumulation and transfer.
- Recommendation 21 Valid objective methods of student and teaching staff assessment must be integrated into courses seeking accreditation.
- Recommendation 22 National accreditation guidelines need developing for local implementation.
- Recommendation 23 Credit accumulation and transfer schemes should be investigated to allow progression over a number of years in different geographical areas.
- Recommendation 24 Any Planned course should develop links with, and integrate wherever possible into appropriate existing HI courses.
- Recommendation 25 Managerial and resource support should be made available to develop a national forum for teachers of HI including regular newsletters and more importantly face to face meetings.
- Recommendation 26 A project involving the thorough quantitative evaluation of a pilot national newsgroup for Hospital Doctors interested in HI should be implemented. The newsgroup should be given a high profile and marketed nationally. Initially it may be necessary to offer incentives to users. Methodologically it would be an advantage to develop some type of RCT involving alternative interventions and if at all possible randomisation.
- Recommendation 27 Those who actually teach HI should make every effort to develop an understanding of both the clinical environment and IM&T / HI which includes obtaining the appropriate qualifications. Medical schools should be involved in course development, particularly if it is anticipated that clinicians will undertake the course.

3. Introduction

3.1 Scope and status of report

This report contains a detailed description, along with outcomes, of the pilot introduction to health Informatics course for specialist registrars run earlier in the year at Newcastle Medical School. The report also contains appropriate recommendations along with an executive summary.

The views presented in this document are those of the course leader, Robin Beaumont and not necessarily those of the Sowerby Centre for Health Informatics or the project commissioners.

3.2 Structure of this report

This report consists of the following sections:

- Introduction - This section which provides details from the project specification document concerning the purpose, scope and expectation of the project.
- Pilot course details.
- Evaluation - methods used and details of results obtained.
- Way forward for Newcastle - details of how the author perceives SpR HI training progressing at Newcastle based upon analysis of the evaluation findings. A four stage approach is described of which the third stage is the Core Health Informatics Module (CHIM).
- Core Health Informatics Module (CHIM) - This is the current course which has replaced the pilot at Newcastle. Full details are given concerning structure, curriculum and resource requirements. Examples of detailed learning outcomes are also provided.
- Recommendations - a set of recommendations to facilitate the development of HI training for SpRs at Newcastle. Along with a description of issues considered to be important when setting up a HI course for SpRs.
- Appendices - a collection of questionnaires used during the pilot along with revised versions for the coming year.

3.3 Background

The Sowerby Centre for Health Informatics at Newcastle University was commissioned at the end of 1996 to set up a pilot introductory course in Health Informatics for Specialist Registrars (SpRs). The following sub sections are abstracts from the draft outline specification supplied to the pilots.

3.3.1 Purpose

To implement a programme of learning based upon the principles embodied in the postgraduate working group guidance document capable of being sustained beyond the pilot and extended to other sites under similar conditions.

3.3.2 Scope

Pilot activity will include:

- 'Marketing' the programme
- Recruiting to the programme
- Pre-programme assessment of learning needs
- Post programme assessment of benefits to the learner
- Learners having their own learning programme with individual objectives
- Identification of trainer learning needs
- Meeting trainer learning needs
- Assessing the relevance of the guidance on detailed content
- Creating relevant learning materials
- Making training opportunities available to other sites

Pilot activity will not include:

- Extensive additions to the existing infrastructure
- A focus on information technology development at the expense of other areas of Informatics and / or education in Informatics

3.3.3 Expectations

Amongst those presented in the draft document included:

- Each pilot should be able to demonstrate strong management of the project with appropriate clinical supervision.
- The run time should be 1 year with a start date agreed with the steering group.
- Each pilot should agree the target number of learners to undertake the programme with the steering group. The intention would be to achieve a number which represented value for money but represented a manageable number for local resources.
- "Learners" would mean practising clinicians representing a mix of specialties.
- It would be expected that learners would complete some kind of pre-post assessment to determine the level of learning and benefits delivered through the programme.
- The expectation for each site to 'train the trainers' would be to offer to share / transfer the experience and learning gained through the project, by offering other sites appropriate learning opportunities in a form agreed with the working group.
- Any products resulting from the pilot will be subject to crown copyright and may be used freely by other NHS healthcare organisations.

4. Course details

This chapter provides details of the pilot course. Where original plans were subsequently modified or abandoned these are discussed in the relevant sections.

4.1 Rationale

Formulating the course involved two core activities, a cursory literature review along with in depth discussions with stakeholders including those involved in HI.

4.1.1 Literature review

A formal literature review was not carried out for two reasons, the findings would probably be of limited value (too theoretical, and not UK based) and because of the very stringent time scale of the project. The basis for the content for the pilot course was the 1889 NHSTD document 'Information management and technology - Strategy for training and staff development' The document divided potential learners into five categories of which two of these are applicable to SpRs:

- **"Operational Information Users** - This is the largest group containing clinical, nursing, professional, technical and paramedical staff, who use information to make decisions about patients and resource use.
- **Managerial information users** - Departmental, district and regional managers, including senior clinicians, finance and administrative staff, who use information to monitor overall performance and plan for the future"

The learning needs for operational informational users were defined as being:

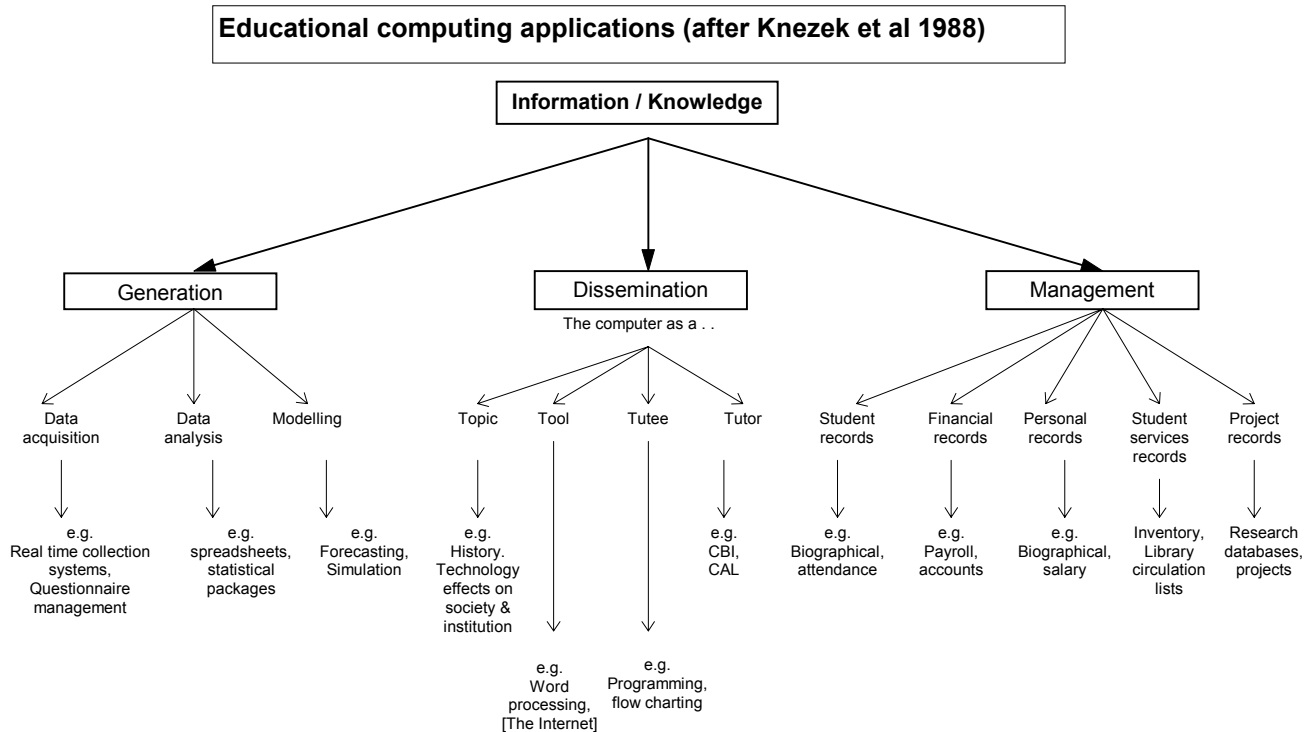
- Proficiency in the skills of keyboard, terminal, word processing, micro computer, electronic mail, data communications and office automation operation.
- Understanding of data recording and information systems, and the importance of accuracy, detail and timing.
- Understanding of departmental information systems, the role of information systems in the NHS, the effect on working practices, and security and confidentiality.
- Proficiency in interrogation and enquiry languages, spreadsheets and extracting printed reports.
- Information presentation and communication skills.
- Being able to analyse, interpret, evaluate and manage information.
- Understanding the Korner requirements and data modelling, and the implications for the use of information management.
- Understanding what is possible now and in the future, with information technology, including data communications and networking.
- Understanding the implications of change, both before and after new and improved information systems are implemented.

While the needs of managerial information users were defined as:

- Understanding information strategies, and how they relate to the assessment of health care needs, and planning of services, the setting of objectives, and the evaluation of health care outcomes.
- Information management and derivation, including the Korner requirements.
- Evaluation of statistics, performance indicators, quality assurance measures, survey methods and research uses of data.
- Data protection and confidentiality requirements.
- Analysing and specifying information systems requirements, and assessing what is feasible.
- Project control procedures.
- Management of change during the implementation of new systems.
- Current and future impact of IT in the NHS, including data-base systems and NHS data-models, communication networks and computer hardware and software developments.

The above recommendations were found to be very useful in devising the course contents.

The pre course needs assessment indicated that any degree of computer literacy was lacking in the majority of participants. Therefore besides offering basic IT skills sessions in the course an attempt was made to introduce the computer in as many different contexts as possible. To help frame the discussion the taxonomy by Knezek, Rachlin & Scannell (1988), was used:



Taking into account the information in the above diagram along with the small size of the pilot it was felt appropriate to use the computer primarily for data acquisition, analysis and as a information dissemination tool during the course.

Howard et al (1986)¹, demonstrated that approximately one third of students in an introductory computer course had seriously high levels of computer anxiety. The proposed course therefore attempted to reduce computer anxiety as much as possible. ²Ray & Minch (1990) quote Howard & Smith (1986), who stated that the only way to lessen computer anxiety is to apply an involved hands-on education or training program to the problem. The course would therefore need to provide a friendly / supportive hands-on element.

During the planning stage the suitability of using CBI / CAL (Computer Based Instruction / Computer Assisted Learning) for parts of the course was considered in more depth using the nomenclature devised by Black (1987) based upon the work of Gagne (1977). Black defined a set of learning actives which he called 'learning modes' of which a sub-set embraced the use of a computer and specifically types of CAL.

¹ Howard G S, Murphy C M, Thomas G E (1986) Computer anxiety: considerations for design of introductory courses. In proceedings of the 1986 Annual meeting of the decision support sciences institute, pp. 630-632 Atlanta, GA: Decision Support Sciences Institute.

² Nina M Ray, Robert P Minch (1990) Computer anxiety and alienation: towards a definition and parsimonious measure. Human factors 32 (4) 477- 491

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These 'learning modes' are listed below. The asterisk in the following table indicates where an authoring package can be used relatively easily to create the Computer Based Instruction (CBI) programs:

Type of 'learning mode'	Description
Pre*	Presentation of visual materials, including dynamic graphics.
CBI*	Computer based instruction: didactic learning, immediate feedback.
TUT*	Tutoring: more flexible approach. Answers with feedback offers choices, options & help facility.
IV*	Interactive video.
REC*	Record keeping of student progress & performance, presenting & scoring tests, and recommended future learning events.
Sim	Simulations. Underlying model determined by author student free to input data and see consequences.
MOD	Modelling. Allows student to create and test models (Ogborn 1987). Only available in specialist facilities. Software expensive and requires basic computer knowledge.
DAT	Data retrieval and interrogation using a particular application (spreadsheet, statistical application etc.).
DC	Data capture. Usually from equipment external to the computer through an analogue to digital converter (ADC) to collect data from the real world.
OEP	Open ended problems. Student presented with a problem having numerous solutions e.g. word processor and spreadsheet problems.
NON	Non-computer based activities. Not everything can nor should it be done on the computer e.g. communications skills.
TEAC	Teacher. Evaluative component of learning carried out by a teacher possibly at a latter date e.g. analysing printed or electronic output.
SELF	Self(student). Student carries out evaluative component of learning e.g. assessing programs by considering alternative strategies.

The nomenclature can be found on the following page. Black considered the learning task to be a continuum from a simple level of 'information retaining' to that of 'attitude formation' along one axis whilst along the other the different role of the teacher was classified as that of being from the most basic of 'gaining attention' to that of enhancing performance. He then considered the suitability of CAL at each of these levels. Those entries in the diagram which are surrounded by a rounded box indicate areas where it would be relatively difficult / expensive to use CAL.

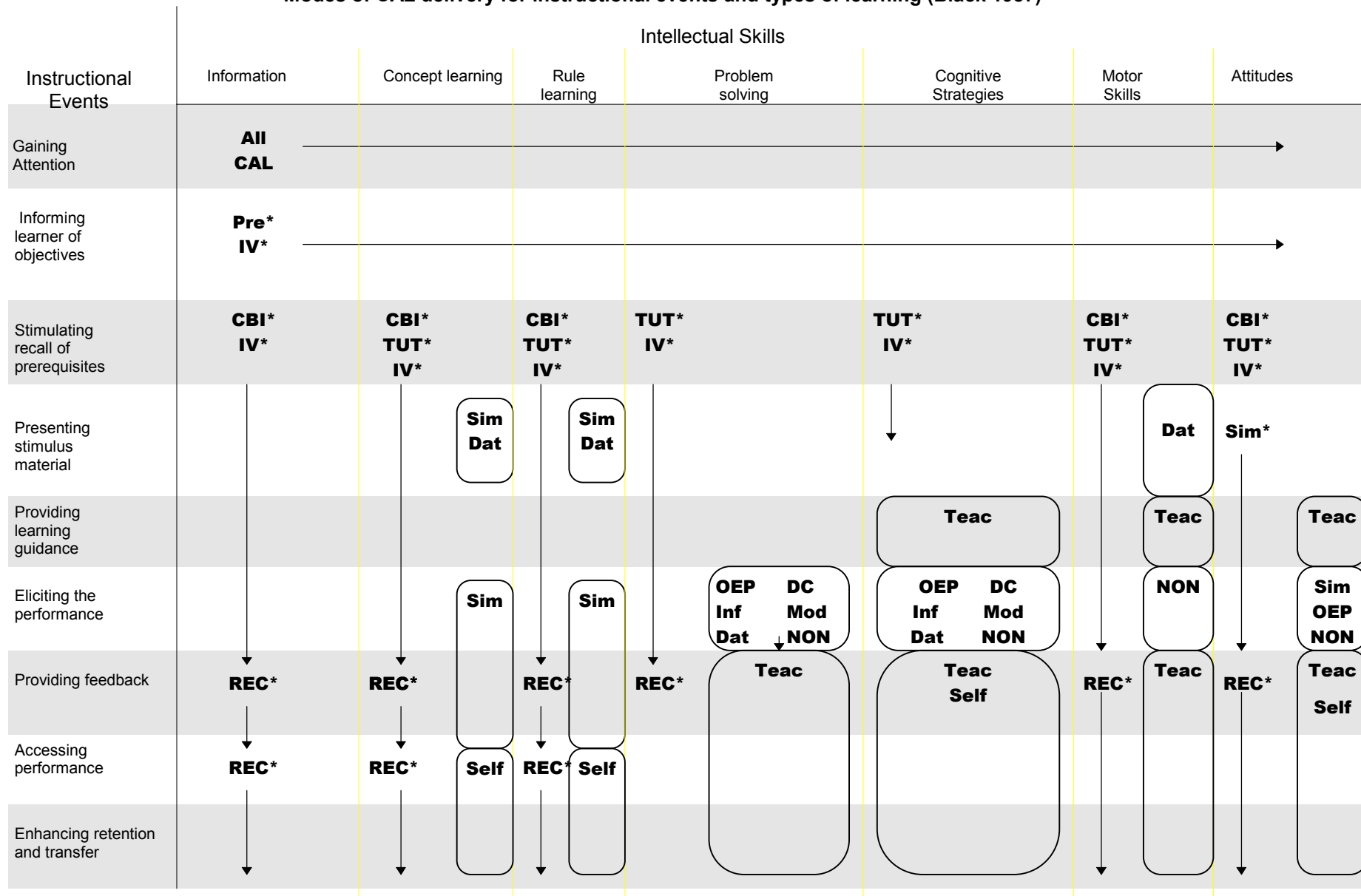
Taking into account Black's nomenclature and the course's aim, which was to ultimately facilitate problem based learning and encourage discussion, including analysis, of the various issues presented earlier in the course it was considered suitable to use CBI for teaching some of the elementary IT skills / knowledge along with Pre learning modes. At a more pragmatic level it was known that the Medical Computing Centre at Newcastle Medical School had already devised such courses. The 'Dat' and 'OEP' learning modes, both not easily adapted to CAL, would represent the dominant learning strategy for the majority of skill development sessions, therefore the computer's role in the course would be mainly as a 'tool' rather than a 'tutee', using Knezek's terminology discussed earlier.

Because of time constraints it was not possible to consider other computer based learning resources such as MICS³ produced by Alan McWilliams at Liverpool university or the personal health record pack produced as part of the EPR programme for the IMG⁴.

³ Copies available from the MIDAS unit, Whelan building, The University of Liverpool, L69 3BX tel. 0151 794 5602

⁴ Copies are available from DoH PO box 410, Wetherby West Yorkshire, LS23 7LN tel. 0193 7840250 [IMG code: A 1057]

Modes of CAL delivery for instructional events and types of learning (Black 1987)



4.1.2 Stakeholder analysis

In addition to the literature review the rationale for the course content and method of delivery was based upon discussions with Di Millan and the course leaders' own experience from running similar courses in the past. Detailed course structure was also discussed with each of the 'champions' for each of the chosen specialties (see below).

Several informal visits to places that had run similar courses in the past (St James Leeds, Cardiff medical school) were undertaken. Di Millan, in association with St James, Leeds and SCATA (Society for computing and technology in anaesthesia), had run several introductory courses for SRs in anaesthesia. This was done after a survey of all registrars and SRs in the former Yorkshire region. She felt the following factors were essential for success of any course:

- Content of the course must be very relevant to the clinical situation, that is specialty specific.
- Peers must play a dominant part in setting up, helping run and endorsing such courses. 'Courses for doctors by doctors'.⁵

4.2 Structure

Venue - Newcastle Medical school

Duration - February to May 1997 (post course evaluation workshop in June)

Maximum number of students - 30 for further details see the section on process

Fee - none.

Pre-requisites - none. A pre-course assessment of each participants need dictated which of the timetabled sessions, additional homework exercises, and most suitable sub group of possible assignments to consider.

Computer requirements - The possession of a personal computer was not required.⁶

Course Structure - overview:

Needs assessment questionnaire mailed to all course participants.

30 minute one to one pre-course meeting with course leader to discuss individualised learning needs based partly upon results of needs assessment questionnaire.

Pre-course resource pack provided.

6 discrete full days education - details provided below in timetable section.

15 minute one to one post-course meeting with course leader to provide feedback on assignment and develop ongoing learning strategy.

Post course evaluation questionnaire distributed and completed by participants.

Half day course evaluation workshop, including presentation of possible way forward.

Because this was a pilot a greater emphasis was placed on evaluation than is usually given.

⁵ This assertion was investigated in the evaluation questionnaire. For details see the evaluation report chapter section 5.3.16 - Lack of Importance of medical training for course leader.

⁶ It had been hoped to be able to provide a laptop to each student for the duration of the course for a nominal fee. Unfortunately this proved impossible.

4.3 Content

4.3.1 Introduction - Aims

The overall aim of the course was to provide a general introduction to Health Informatics in terms of both knowledge and supportive skill development. The teaching strategies employed facilitated a problem based approach to learning and supported students in developing pro-active learning skills.

4.3.2 Learning objectives

The learning objects are presented below from the participants perspective, technical equivalents are available from the course leader.

- To understand how various methods of information collection, processing and retrieval can enhance professional performance
- To gain practical experience in the use of technology that supports information collection, processing and retrieval.
- To gain some experience in the methods used for specifying the characteristics of required information.
- To develop an awareness of the methods used to evaluate various methods of information collection, processing and retrieval.
- To gain knowledge of how information, its specification, management and retrieval and supportive technologies effects the organisation
- To further professional development in the form of a written assignment chosen by each course member.

4.3.3 Detailed timetable

The following two pages provide detail's of the pilot course, from that of both the participants' and technicians' perspective. It is recommended that most readers only examine the participants perspective.

4.3.3.1 Participants perspective

Time	Pre course	Day 1 (Wednesday 5 th Feb)	Day 2 (Wednesday 12 th March)	Day 3 (Wednesday 26 th March)	Day 4 (Wednesday 9 th April)	Day 5 (Wednesday 30 th April)	Day 6 (Wednesday 14 th May)	Post Course (Wednesday 4 th June)
9 - 10	One to one visit	Using technology to help with your work (1) - practical exercises	Using technology to help with your work (3) -practical exercises	Collecting information (3)-practical exercises	Retrieving information (3)-practical exercises	Using computers in the workplace (group exercise with video)	Making sense of large amounts of complex information (1)-practical exercises	half day Evaluation workshop
10 -11		Using technology to communicate - practical (1)	Using technology to communicate - practical (2)	Retrieving information (1)-practical exercises	Retrieving information (4)-practical exercises		Making sense of large amounts of complex information (2)-practical exercises	
11.10 - 12		Explaining data, information and knowledge	Does and don'ts when helping develop methods of information management (1)	Retrieving information (2)-practical exercises	Retrieving information (5)-practical exercises			
12 - 12.50		Using the Library	Does and don'ts when helping develop methods of information management (2)	Evaluating methods of information management (1)	Social / Organisation Issues (2) Information centres	Social / Organisation Issues (3) What the experts say	Classifications HRGs and Casemix etc!	
Lunch								
1.30 - 2.30		Methods of collecting, processing and storing information	Defining information characteristics (2)	Using information to help make decisions (1)	Clinical system case study (1) presentation	Moving information around	audit system case study presentation	
2.30 - 3.20		Defining information characteristics (1)	Collecting information (1) -practical exercises	Social / Organisation Issues (1)	Clinical system case study group exercise	Using information to help make decisions (2) ⁷	audit system case study group exercise	
3.30 - 4.30		Using technology to help with your work (2) - practical exercises	Collecting information (2) -practical exercises	How to do mind blowing presentations		Library session (2)		
			Personal tutorials - for assignments	Personal tutorials - for assignments	Personal tutorials - for assignments	Personal tutorials - for assignments	Personal tutorials - for assignments	

Assignment								(due in Monday 19 th May 9am)
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'Homework'								
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⁷ This session was changed to a very basic introduction to statistics and a introduction to the Gpower application for working out sample sizes.

4.3.3.2 Technical perspective

Time	Pre course	Day 1 (Wednesday 5 th Feb)	Day 2 (Wednesday 12 th March)	Day 3 (Wednesday 26 th March)	Day 4 (Wednesday 9 th April)	Day 5 (Wednesday 30 th April)	Day 6 (Wednesday 14 th May)	Post Course (Wednesday 4 th June)	
9 - 10	One to one visit before day one	Practical (Cookson computing (1)) file manager word processing exercises	Practical (Cookson computing (2)) Excel	Database practical (3) Simple two table exercise	Database practical (6) Simple queries	Information systems as social systems (3) HCI and Clinical method (group exercise with video)	SPSS (1)	half day Evaluation workshop	
10 -11		email	Practical: WWW - HTML newsgroups services available	Database practical (4) Simple reporting	Database practical (7) complex queries (a)		SPSS (2)		
11.10 - 12		Data types, tables, information, knowledge and wisdom	Systems development methods (1)	Database practical (5) Simple reporting (2)	Database practical (8) complex queries (b)	Information systems as social systems (2) Information centres	Information systems as social systems (4) Discussion of literature		Classifications HRGs and Casemix etc!
12 - 12.50		Library on line search demonstration	Systems development methods (2)	System evaluation (1)					
Lunch									
1.30 - 2.30		Types of information systems and development lifecycles	Dynamic models	Decision support (1) - a demonstration of decision trees	Clinical system case study (1) presentation	Database practical (9) exporting data	audit system case study presentation		
2.30 - 3.20		Object models	Database practical (1) Tables Data entry	Information systems as social systems (1)	Clinical system case study group exercise	Decision support (2) complex methods	audit system case study group exercise		
3.30 - 4.30		Practical (Cookson computing (2)) Style sheets Home machine connectivity	Database practical (2) Relationships	Practical: Presentation software		Library session (2)			
			Personal tutorials - for assignments	Personal tutorials - for assignments	Personal tutorials - for assignments	Personal tutorials - for assignments	Personal tutorials - for assignments		

4.3.4 Resource pack / support

A resource pack consisting of the following was produced:

- Lecture handouts
- Practical session handouts
- Background reading

4.3.5 Assessment

This did not form a part of the course.

4.3.6 Possible assignment titles

The original intention was to ask each participant to undertake an assignment which would provide the opportunity for gaining further knowledge and / or skills in a particular area. However in practice this proved very difficult. Although several people came on the course to solve specific problems and used these as a basis for the assignment the majority of learners felt that they were unable to cope with the additional commitment.

Possible assignment titles that had initially been suggested to learners are listed below:

- Consider and develop, along with some course material, a introductory one day course in one particular aspect of Health Informatics. The course should be for a specified professional group.
- Produce an introductory learning guide. It should be for a specified group and consider a particular clinical interest of your. This can be achieved by using HTML or learning a specialised authoring tool.
- Investigate the effects that computers have found to have upon your clinical area by way of a literature review (base articles provided in resource pack).
- Investigate the general and local availability of CD roms suitable for medical students by way of a survey and literature review.
- Review the various software packages available for clinical audit.
- Example of a title for a student with programming experience: Consider the basic requirements and develop a small database for one of the following, recording outpatient clinical information for a specific clinic, allowing ordering of various services from a ward. GP prescribing.
- Adaptation of the above for a student with no prior programming experience:
- Consider the basic requirements, both in terms of object and dynamic models for one of the following areas, recording outpatient clinical information for a specific clinic, allowing ordering of various services from a ward. GP prescribing.
- Design and produce a videoed role play demonstrating the effects the use of a computer has upon the consultation. Findings from the research literature (articles provided in resource pack) should be used to help plan the content.

4.4 Process

A satisfactory process for marketing, recruiting and running the pilot course was established following discussions with the post graduate dean, representatives at the post graduate medical education centre at Newcastle and the IM&T (Information management & training) advisor for the Northern and Yorkshire region (Di Millen). Advice was also sought from individuals with a known interest in health informatics.

4.4.1 Choice of specialties for pilot

With the above points in mind it was decided to restrict the pilot to a small group of specialties with known interests in Informatics, and known 'champions' within the region. The specialties chosen were:

Paediatrics (Fraser Alexander)

Care of the Elderly (Rose Ann Kenny)

Rheumatology (Phil Platt)

Anaesthesia (David Grieves)

General Surgery (Alan Rich)

Dentistry (David Smith / Tony Anderson)

4.4.2 Number of participants

The following four factors were considered when deciding upon the number of participants:

- The desire to include the above 6 specialties
- The computing cluster which was available for use had 40 stations.
- The availability of demonstrators during practical sessions (a 1: 8 to 1:10 was an expected minimum level of support).
- Financial restraint of pilot (30K)

Taking the above factors into account it was agreed to accept thirty (5 from each specialty).

4.4.3 Recruitment process

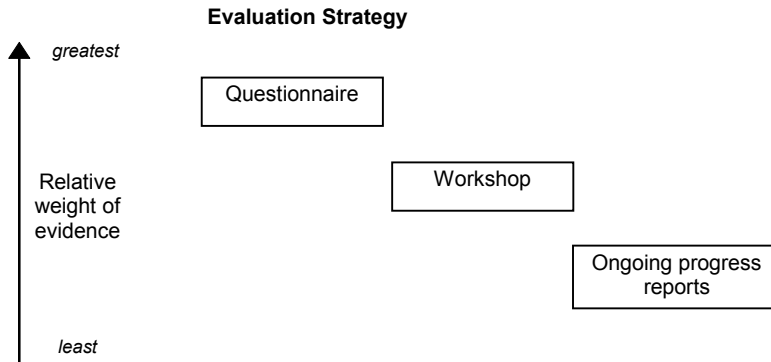
It was agreed that recruitment would be through the above identified champions. Each champion provided 5 nominees for the course. How such nominees were obtained was left to their discretion. Two methods appear to have been adopted, first come first served and choice of individual based upon the champions knowledge of the individuals need.

Because the course was to be delivered at Newcastle medical school it was decided to recruit from local hospitals (Newcastle and Tyneside).

5. Evaluation

5.1 Methods adopted

The evaluation for the Newcastle pilot course consisted of a post course assessment, a half day workshop and two ongoing progress reports. The evaluation therefore had both qualitative and quantitative components. Evaluation information was only obtained from the learners in this instance rather than fellow academics and possibly other professional groups as they were not considered to be the focal point of the course.



In terms of generalisability, reliability and validity of any data obtained the greatest emphasis should be given to the evaluation questionnaire results, secondly to the results from the workshop and thirdly to those of the narrative progress reports. The progress reports are particularly unreliable because of the extremely subjective nature of some of the comments made in them, dependent entirely upon the mood of the writer (the author of this report) at the time.

With the above considerations firmly in mind the rest of this chapter is devoted to a description of the findings from the evaluation questionnaire. A subsequent, much smaller, chapter presents the findings from the workshop and progress reports in terms of any additional data obtained.

5.2 Generalisability issues

Several factors preclude generalising these results to a wider sample such as a 'typical' SpR in the northern deanery. The main problems are listed below:

- The voluntary nature of the learners participation in the course
- The lack of knowledge concerning the typicality of the learners regarding benefits obtained, or not, from the course
- The close proximity to the medical school to those learners offered a place on the course
- Experiences of learners on pilot course may be atypical

5.3 Evaluation questionnaire results

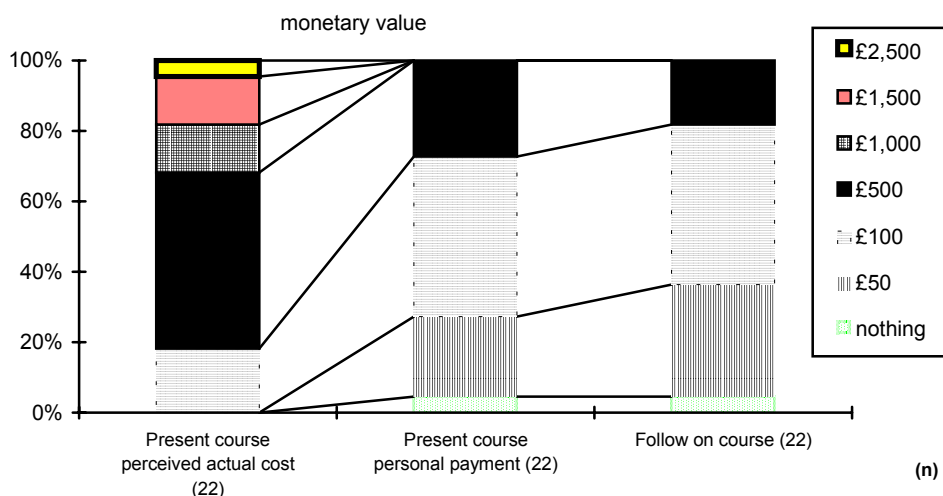
The following section provides details of the pertinent findings from the evaluation questionnaire. It should be noted that this is not a discussion of all the results obtained which included, amongst other data items, comments upon performance of individual members of staff. Such data items were made only available to the staff directly concerned.

5.3.1 The sample

22 questionnaires were obtained from a possible 26. Of the original 30 participants four dropped out for various reasons (two taking up consultants posts. Two for personal reasons; one non work related, personal illness the other because of excessive clinical commitments). Two of the drop outs were from Paediatrics, one from Anaesthetics and the other from Rheumatology. The four questionnaire non responders consisted of two from surgery, and one from both anaesthetics and geriatrics.

5.3.2 Monetary value of present and follow on course

Respondents were asked how much they would be willing to pay personally for both the present course and a future follow on course of four days. They were also asked how much they thought the present course was actually worth per person.



To allow some type of financial forecasting the exact values are given below:

Cost	Present course	Follow on
nothing	1 (5%)	1 (5%)
£50	5(23%)	7 (32%)
£100	10(45%)	10 (45%)
£500	6(27%)	4 (18%)

The above values should be treated with caution when attempting to extrapolate any possible financial gain given the wide confidence intervals⁸:

Present course:

Raw data	proportions	standard error	CI lower	CI upper	% lower	% higher	CI width
1	0.0455	0.0444	-0.0416	0.1325	-4.1588	13.2497	17.4085
5	0.2273	0.0893	0.0522	0.4024	5.2154	40.2391	35.0237
10	0.4545	0.1062	0.2465	0.6626	24.6474	66.2617	41.6143
6	0.2727	0.0950	0.0866	0.4588	8.6622	45.8832	37.2210

Follow on course:

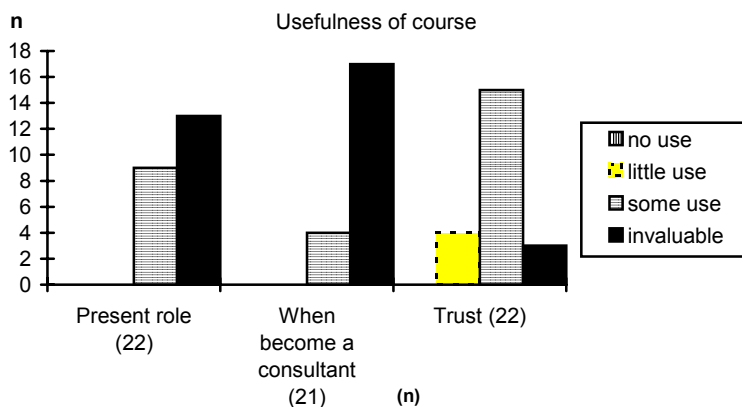
Raw data	proportions	standard error	CI lower	CI upper	% lower	% higher	CI width
1	0.0455	0.0444	-0.0416	0.1325	-4.1588	13.2497	17.4085
7	0.3182	0.0993	0.1235	0.5128	12.3549	51.2815	38.9266
10	0.4545	0.1062	0.2465	0.6626	24.6474	66.2617	41.6143
4	0.1818	0.0822	0.0206	0.3430	2.0647	34.2990	32.2343

⁸ Method used to calculate CI's from Gardner M J Altman D G 1989 Statistics with confidence (p29) BMJ publications London.

With the above warning in mind the present course might have generated £4,250 (5 x 50 + 10 x 100 + 6 x 500) from the present learners. Similarly the present learners are theoretically willing to pay personally a total of £3,350 for a four day follow on course. Both figures represent approximately one tenth of the actual cost of the present course. The above confidence intervals could be used to perform some kind of sensitivity analysis.

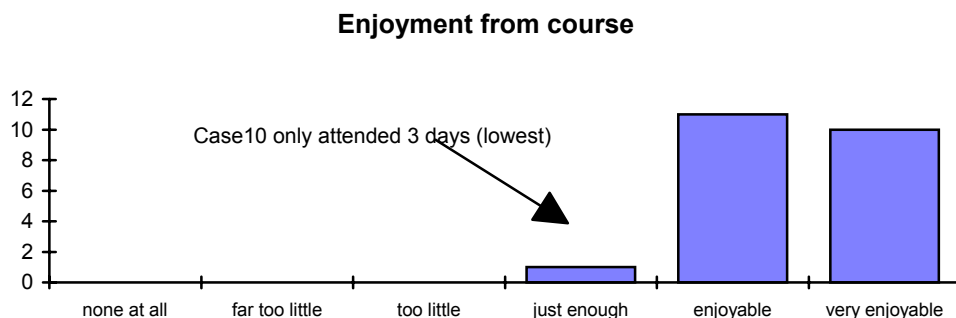
5.3.3 Usefulness of course

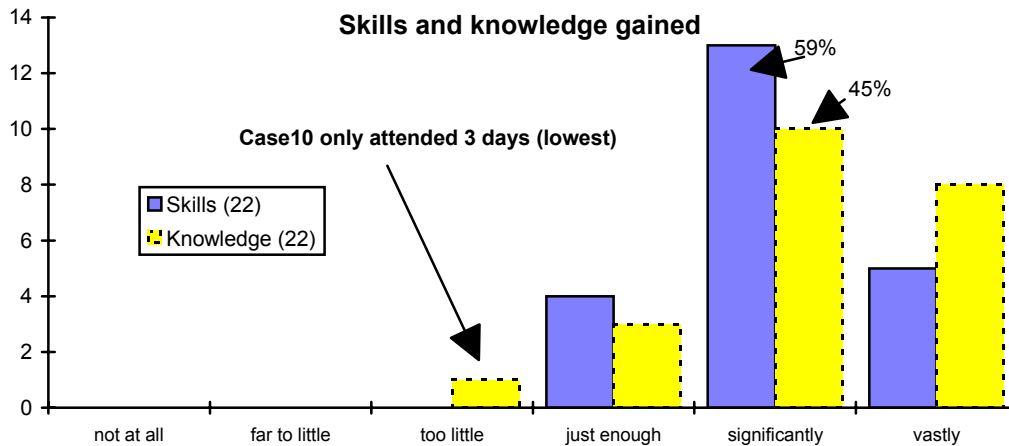
Respondents were asked how useful the course was for their present role, when they become consultants and also for the trust generally. The results are given below. While respondents found the course equally valuable / invaluable in their present role ($\chi^2 = 0.72$, $df=1$, $p=0.39$), a significantly larger proportion considered it to be invaluable when they become consultants ($\chi^2 = 19.72$, $df=2$, $p=0.0001$) and a significantly larger proportion of 'some use' to the trust ($\chi^2 = 12.09$, $df=2$, $p=0.0024$). Four respondents (18%) felt the knowledge / skills they had learnt during the course would be of 'little use' to the trust.



5.3.4 Enjoyment / knowledge / skills gained from course

Respondents were asked how much they felt they had learnt from the course as well as how much they had enjoyed it. The results are given below. Case ten is discussed in a subsequent section.

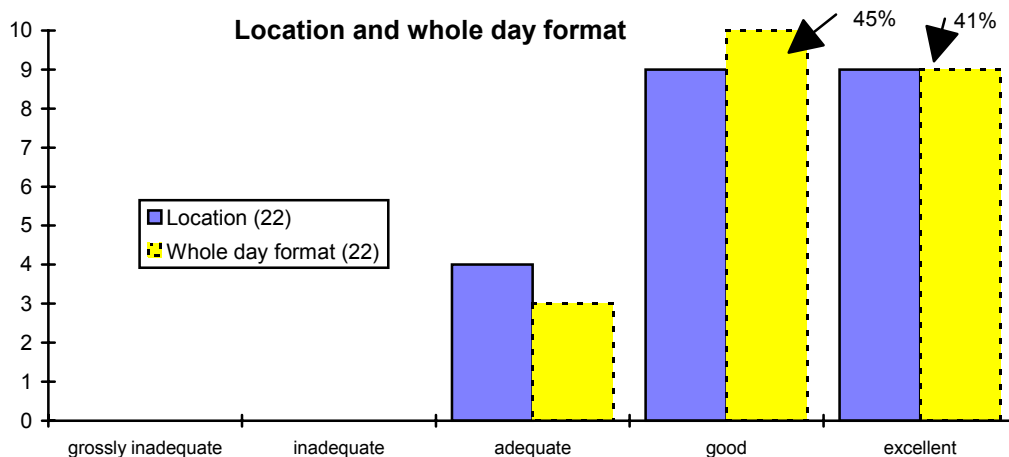




Four fifths (81%, n=18) of respondents felt they had significantly / vastly improved both their health Informatics computer skills and knowledge during the course. The only respondent that felt they had learnt 'too little' had also attended the least number of days.

5.3.5 Venue and format

Although the course was only made available to those SpRs close to the medical school it was still considered sensible to enquire as to the suitability of location, particularly given the known difficulty of parking. Respondents were also asked if the whole day format was appropriate.

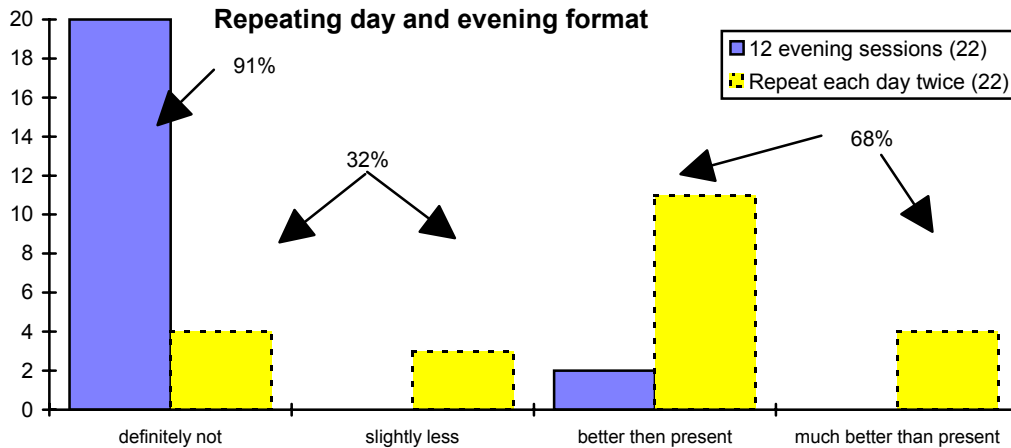


Four fifths (81%, n=18) of respondents felt that the location of the course was good / excellent and a similar number (86%, n=19) felt similarly about the whole day format. No respondent felt either the venue or whole day format were inadequate.

5.3.6 Possible format alternatives

The opportunity was taken to canvas views concerning possible alternatives to the pilot that had suggested themselves during the course. These are given below.

Respondents were asked 'would you have preferred 12 evening sessions?' and 'would you have preferred each day to be run twice on different days of the week allowing you to choose each time?'. The results are given below.

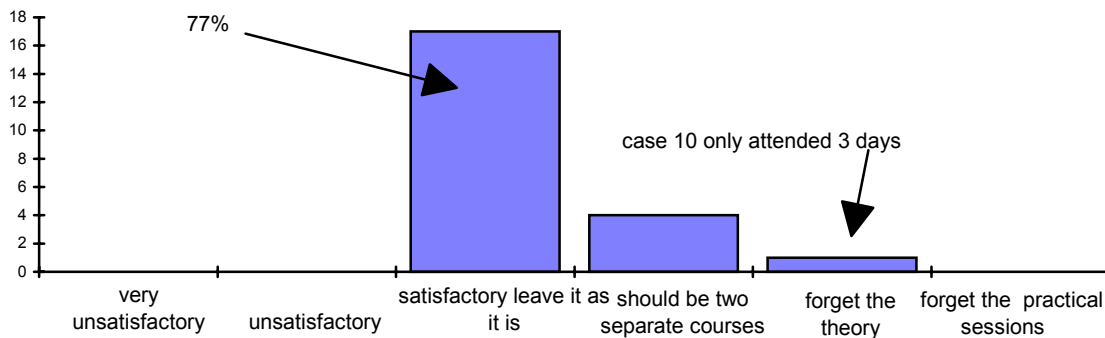


There is clearly overwhelming support for the whole day format, which is re-iterated further in the responses discussed in the following section on distance learning alternatives. The situation is less clear cut when discussing the responses obtained regarding the possibility of repeating the days. Approximately two thirds of respondents felt that it would be better than the present option. This is possibly related to the known problems of running a course on the same day of the week, as this one was, for clinicians who have clinics / operating lists on a set day. Despite this problem approximately one third felt that it would be less satisfactory than the present. Possible reasons for this are suggested in the following section on distance learning alternatives. The significance of the third / two third dichotomy may be fallacious given the statistically insignificant result ($\chi^2 = 2.91$, $df=1$, $p=0.088$).

5.3.7 Theory practice divide

In terms of the timetable sessions the course was divided into two parts, knowledge / theory and the practical skills, although the course leader hoped that learners perceived the two as forming a cohesive whole.

Given this premise the ideal response to a question regarding the knowledge / practical skills divide should have produced responses in the first three categories of the six in the bar chart below:

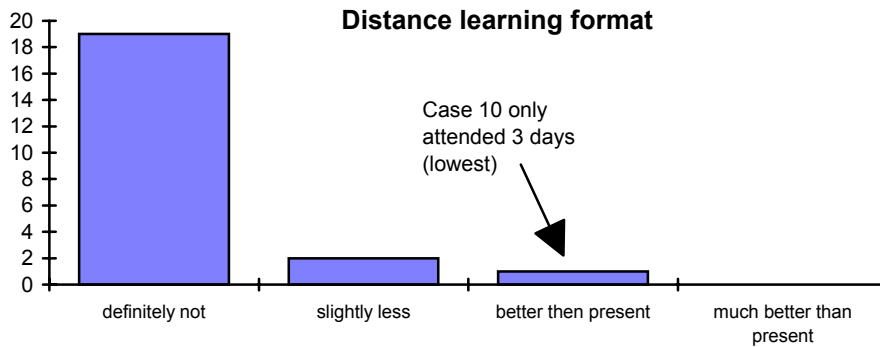


Approximately four fifths of respondents answered the question appropriately. The remaining respondents had unfortunately failed to grasp, due to either their or the course leaders inadequacy, the links that the course leader had attempted to make between the knowledge and skills aspects of the course.

5.3.8 Open and IT facilitated learning options

The external evaluation team were interested in the possibility of developing certain aspects of the course into an open learning package. Two aspects of this issue were addressed in the questionnaire; the participants attitude towards open learning per se and their attitude towards various technological enhancements that might theoretically facilitate this approach.

Respondents were asked if they would have preferred the course to be run as a distance learning package, each of them working on their own with possibly one or two group meetings. The results are given below.

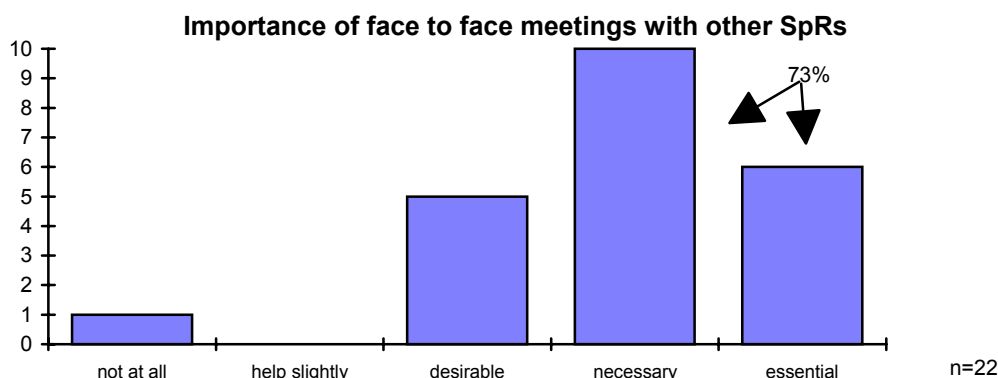


All respondents except case 10, to be discussed below, felt the open learning option would be less satisfactory than the present course. This was highly statistically significant ($\chi^2 = 18.18$, $df=1$, $p<0.00005$).

Respondents were also invited to provide an explanation of their response to the above question. These are given below:

- *'I would find it difficult to make time for working at home on top of clinical / home commitments'*
- *'Doctors as a rule are not used to distance learning and practical sessions are a MUST for computer learning. Also if one goes by the interaction between students/ teachers and the amount of doubts / questions we had a distance learning programme would be clearly impossible!'*
- *'It is much, better to be able to meet fellow course participants, and the course teachers. It's easier to get questions answered as they occur, rather than have to save them for the next 'encounter by post''*
- *'The group discussions were some of the most interesting and informative sessions. I think if we had only met together once or twice the discussions would not have been as open.'* + *'Group discussions most useful part of the course.'* + *'Interaction between group members and the leader(s) was most useful part of the course.'*
- *'I would end up not doing the course or not getting as much out of it'*
- *'Subject is abstract and fairly dry. It needs to be conveyed in an enthusiastic and dynamic manner or participants will switch off'*
- *'The interaction between people was invaluable. I am not that disciplined to tackle difficult issues alone.'*
- *'Advantage that the present format allowed definite time out from clinical commitments'*
- *'Advantage with present format is that working out problems much easier face to face with staff / others at hand.'* + *'Better to work as a face to face group as more focused by coming to sessions and more encouragement.'* + *'On site course with verbal input is a much more effective learning medium than distance learning from home.'*
- *'More incentives for group learning face to face'*
- *'It was really useful to have instant answers to our questions. If this weren't the case I'd have given up at several points, I think. It's also difficult to set aside dedicated time - you can't get the study leave for private study, just for the course.'* + *'Protected time to attend course important for its success.'*
- *'Loan of laptops for those without would have been useful for home exercises'*
- *'Clinical commitments & on call makes it difficult to take out one full day. Working on your own with help material should improve the skills obviously with the help of trainers.'* (case 10)'

All but one of the comments, again from case 10, indicated a wish not to have the course developed into open learning material mirroring the above bar chart results. The importance of face to face contact raised in the above comments was also asked specifically later on in the questionnaire.



Although approximately three quarters of those that responded felt that face to face meetings were more than just desirable this failed to reach statistical significance (binomial =.727, p=0.053). However, if the desirable category were also included the result would be statistically highly significant.

5.3.8.1 The case of case 10

In several of the results above case 10 appears somewhat atypical. This participant was a surgeon who was required to work the maximum number of clinical hours stipulated by the Royal college and found it impossible to obtain the time to attend the course but still remained very keen.

5.3.9 Attendance / distance and specialty

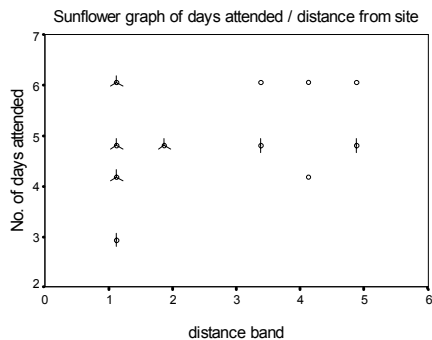
Respondents came from the following hospitals:

Code	Hospitals	Distance from medical school in miles (travelling time by car 8am)	count
1	RVI, Newcastle general, Newcastle dental,	0 -1 (5 - 10 mins)	11 (50%)
2	Freeman, Queen Elizabeth	5 (15 mins)	3 (14%)
3	North Tyneside General	12 (30 mins)	3 (14%)
4	South Tyneside, Ashington, Dryburn	12 - 18 (40 mins)	2 (9%)
5	Sunderland	12 (60 mins)	3 (14%)

Number of days attended, from a total of six.

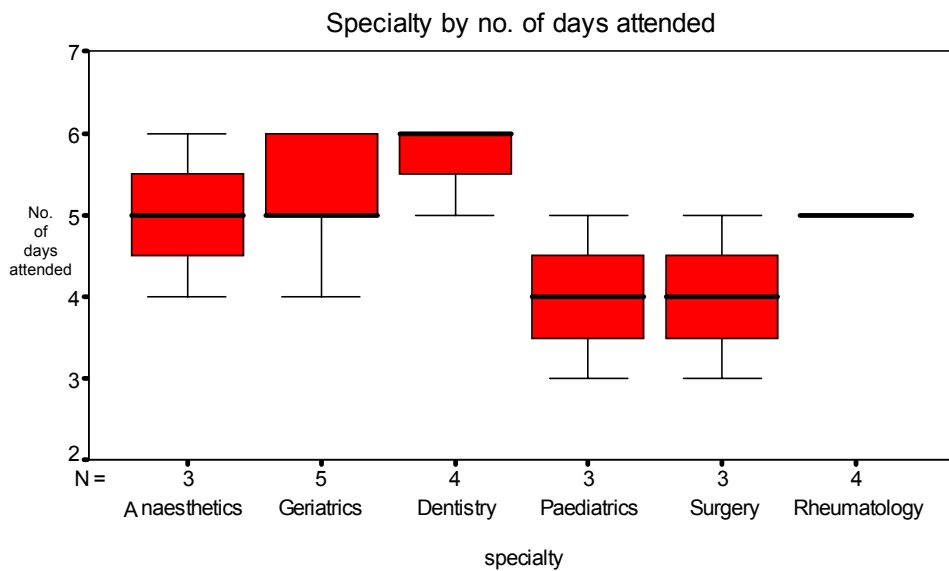
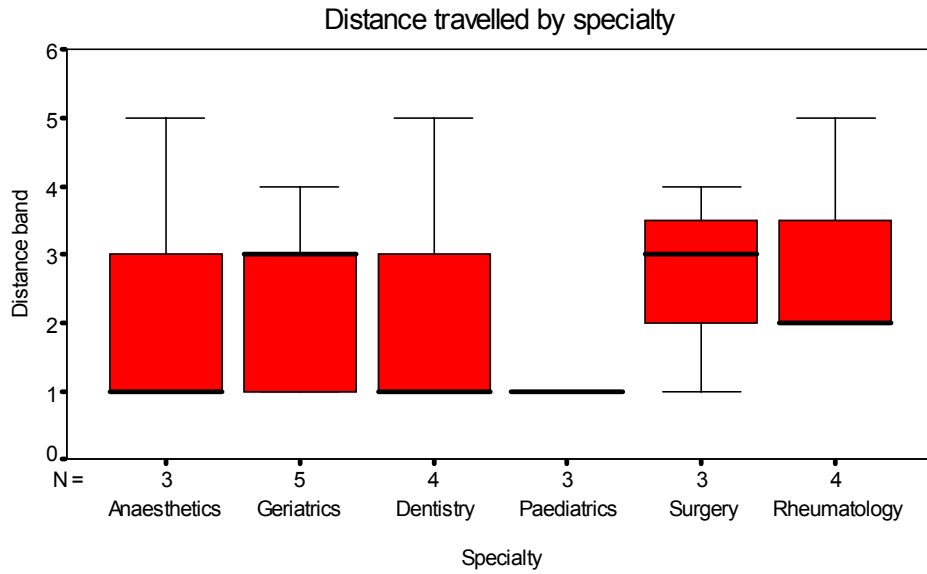
no. of days attended	count
3	2 (9%)
4	4 (18%)
5	10 (46%)
6	6 (27%)

The possibility of there being a relationship between number of days attended and distance from the medical school was investigated. No relationship between these two variables was found to exist in this small sample. The results are given below.



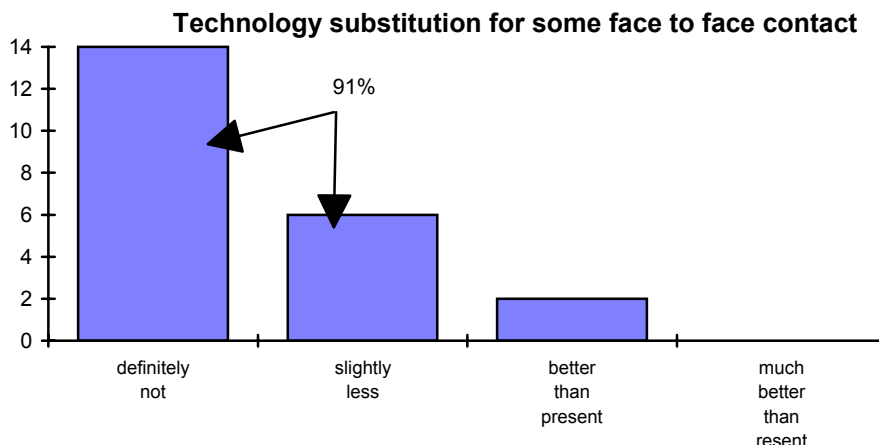
	Days attended
Distance	rho=0.2744 (n=22) p=0.217

The possibility that attendance or distance travelled was different across specialties was also considered. Using a one way non-parametric ANOVA there was found to be no significant difference across specialties for either distance (Kruskal - Wallis = 4.63, df=5, p=0.4620) or attendance (Kruskal - Wallis = 9.50, df=5, p=0.904). The importance of these results should be viewed in the light of the very small sample sizes present in this instance.



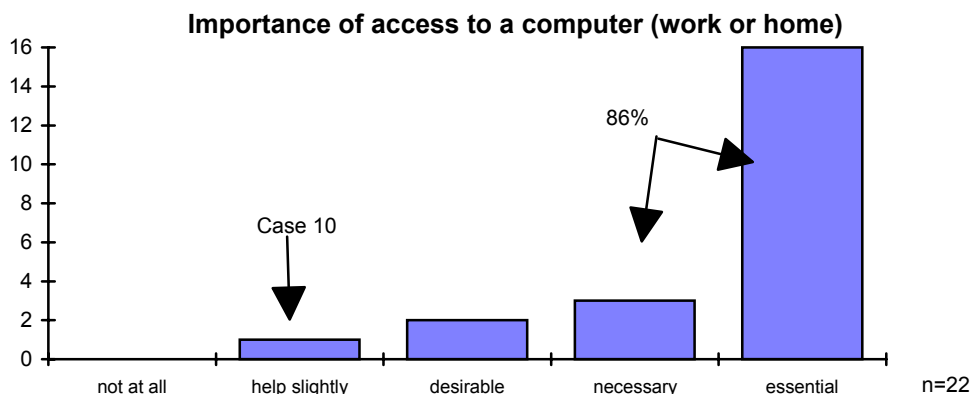
5.3.10 Technology support

Respondents were asked if having provided each of them with a computer (home or work) with e-mail etc. would have been an adequate substitute for some of the face to face meetings. The results are given below.



A statistically highly significant proportion of respondents ($\chi^2 = 14.72$, $df=1$, $p=0.0001$) felt that this would not be an adequate substitute for some of the face to face meetings. Possibly the above cool response is even more surprising given that the participants were exposed to e-mail and the Internet during the course and approximately 75% of them had a home computer⁹.

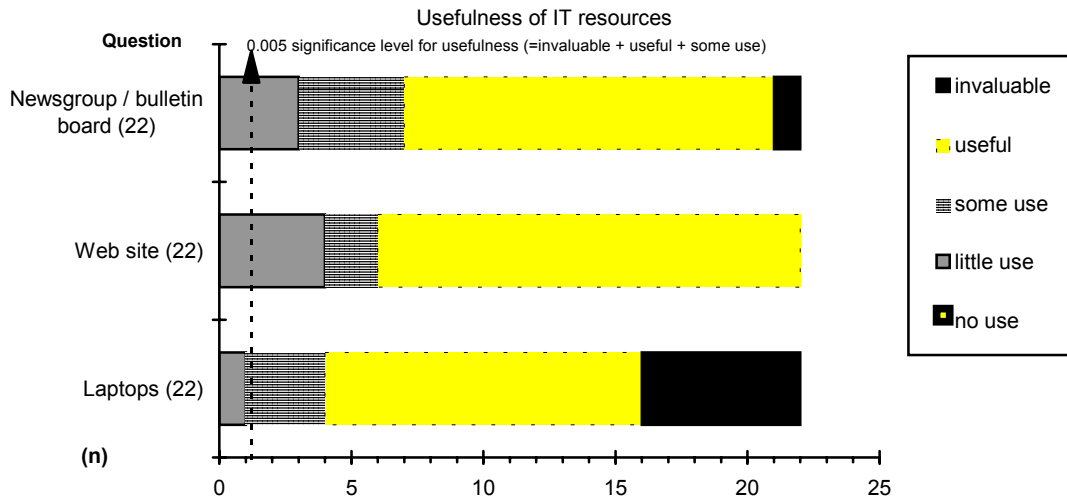
Although respondents did not wish technology to usurp face to face contact it would appear that they were very keen on having ready access to it as indicated in the responses to the following question, 'How important do you think it is for future participants to have access to a computer, either at home or work'. The results are given below.



A statistically significant number felt that access to a computer would be necessary / essential ($\chi^2 = 11.63$, $df=1$, $p=0.0006$). Clearly the availability to a computer for practising skills learnt and developing new ones is a high priority for learners.

⁹ Information from the pre course needs assessment questionnaire report.

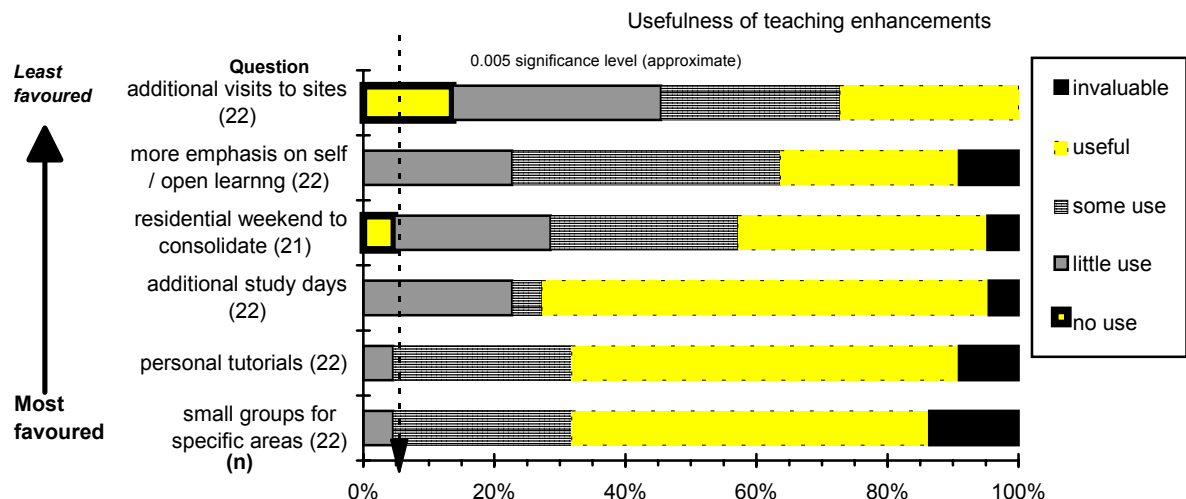
Respondents were also asked how useful they would think a variety of IT facilities, several of which they were introduced to during the course, would be for future courses. The results are given below.



From the above it is noted that only the possession of laptops is highly significant if desirability is considered to be a dichotomous variable ('invaluable', 'useful' and 'some use' opposed to 'little' and 'no use'). The above results must be treated with caution when attempting to extrapolate these to other possible course participants, specialities and the future. For example, from the needs assessment it is known that 71% (n=15) of the present course participants had a computer at home. To investigate this further a regional questionnaire is being designed and distributed to all Specialist Registrars in Anaesthesiology. (please contact SpR anaesthetist Phil Arnold at the Freeman Hospital for further details).

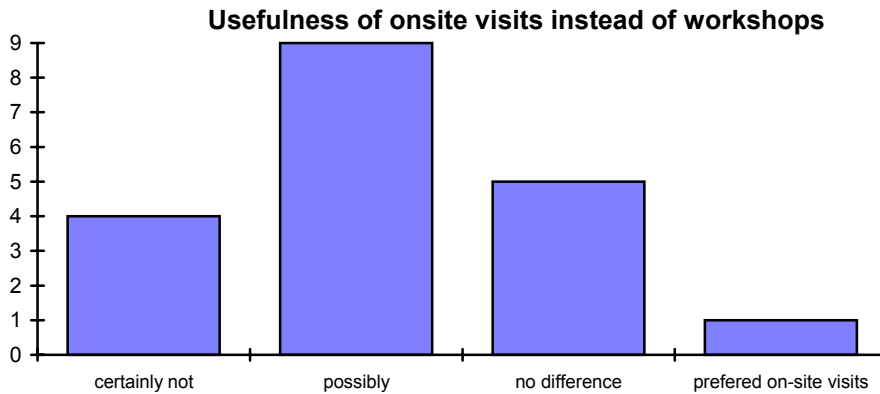
5.3.11 Teaching enhancements

A selection of possible teaching enhancements, listed in the bar chart below, were suggested to participants:



By assuming that the three top usefulness categories in the above graph represent a 'need', ('invaluable', 'useful' and 'some use' opposed to 'little' and 'no use') both personal tutorials and additional small group sessions are statistically significant. Interestingly these are both methods that would increase face to face contact.

The possibility of site visits was also offered as an alternative to the two half day workshops. The results are given below.



The chi square result was insignificant ($\chi^2 = 6.89$, $df=3$, $p=0.075$) indicating lack of evidence for a particular attitude towards visits, reinforcing the result concerning site visits in the previous bar chart where each response to the question is approximately equal.

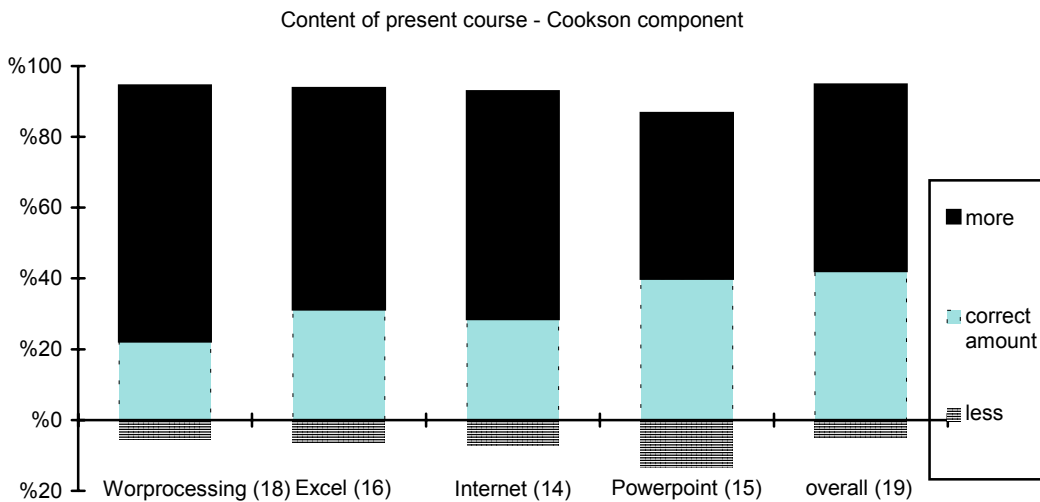
5.3.12 Course content

Participants were given the opportunity to comment on both the amount of time devoted to the various topic areas in the pilot course and also suggest what they felt would be most useful in a further course.

5.3.12.1 Present course

This was divided up into three batches of questions (question 5, question 35, question 4). Please refer to the appendix to review the questionnaire.

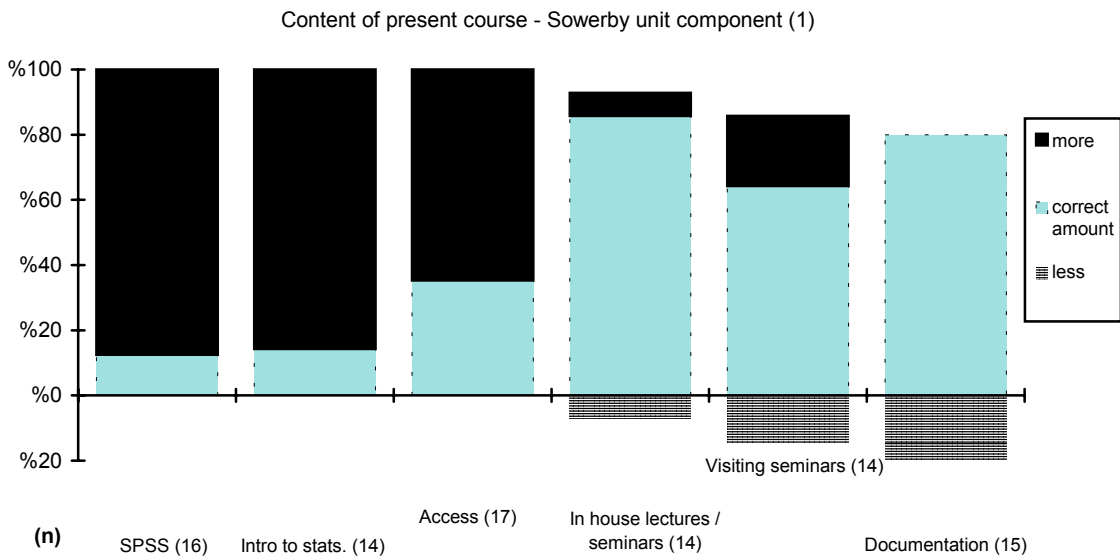
5.3.12.1.1 Cookson computer unit topics



Due to time constraints only a brief introduction to each of the above topics was given. From the above approximately two thirds of the respondents would have liked more teaching regarding word processing, the Internet and Excel.

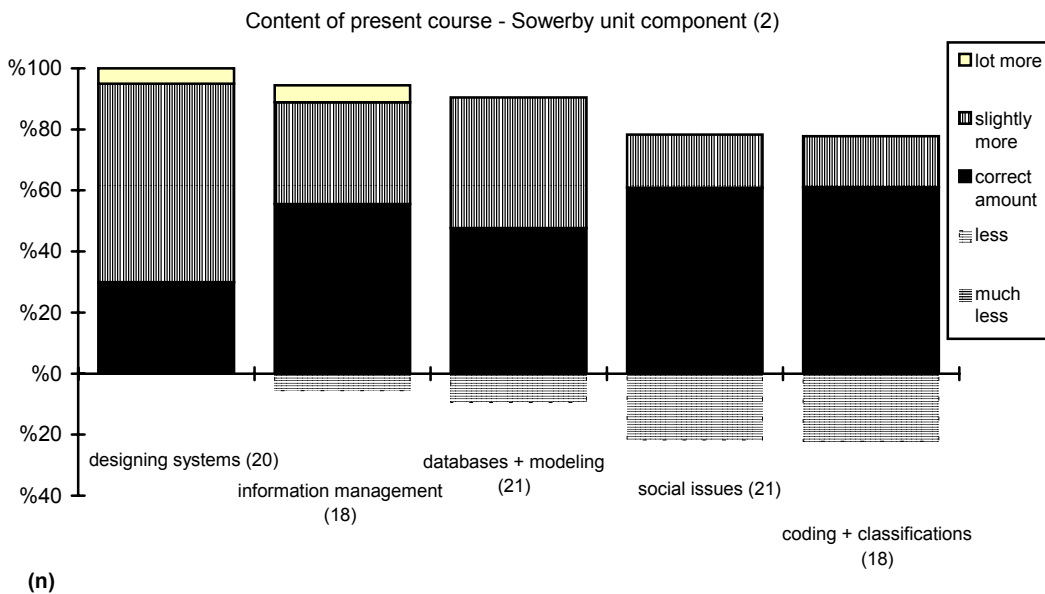
5.3.12.1.2 Sowerby unit topics

Results relating to the Sowerby unit topic areas are provided below.



Approximately 90% of respondents wanted more teaching on SPSS and introductory statistics. This was expected, particularly for the introductory statistics session as the one session provided in the course was the result of canvassing the students after the course began.

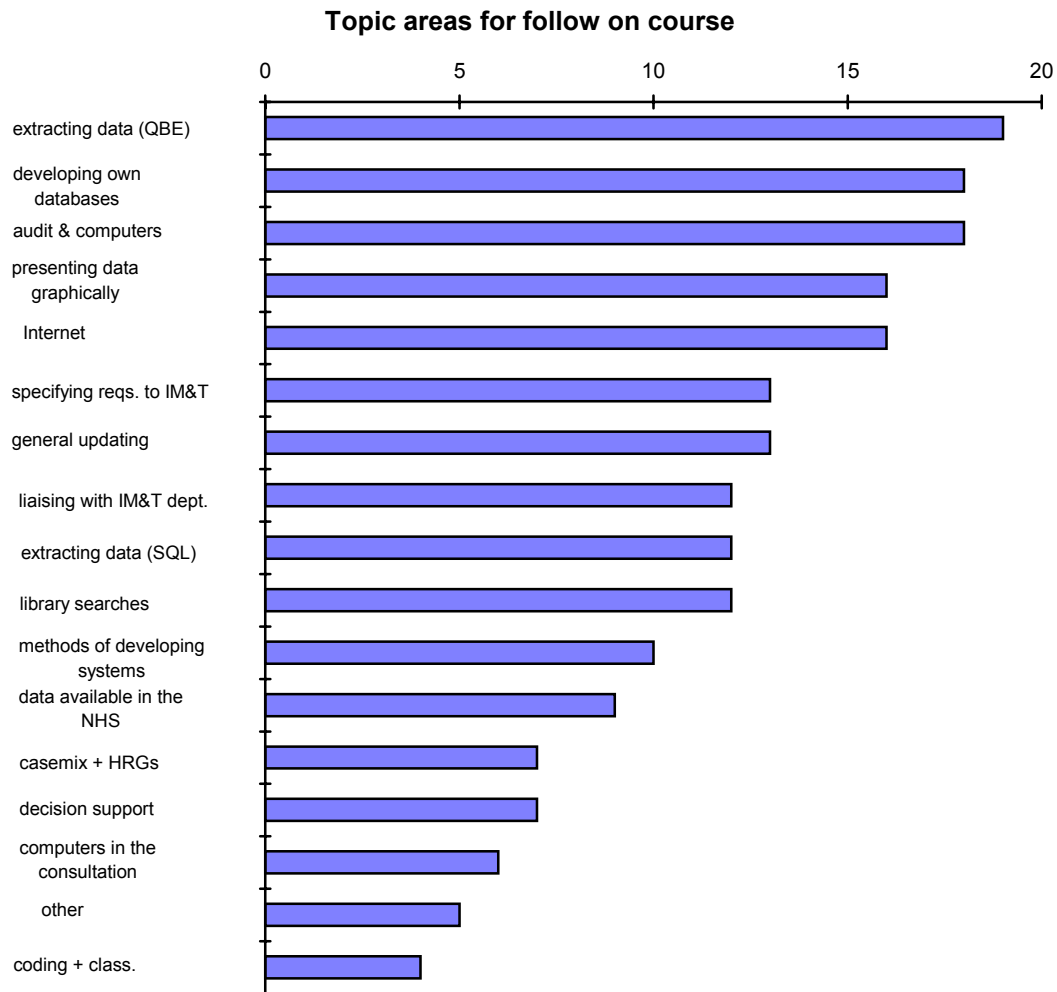
Respondents were also asked about the various in house talks given during the course:



Approximately 70% of respondents requested additional information on designing systems. In contrast approximately 30% wanted less regarding coding and classifications. This is rather strange considering that there was only a single one hour session in the entire course concerned with coding?

5.3.12.2 Follow on course

Respondents were asked what they would like in a follow on course from a pre defined list:



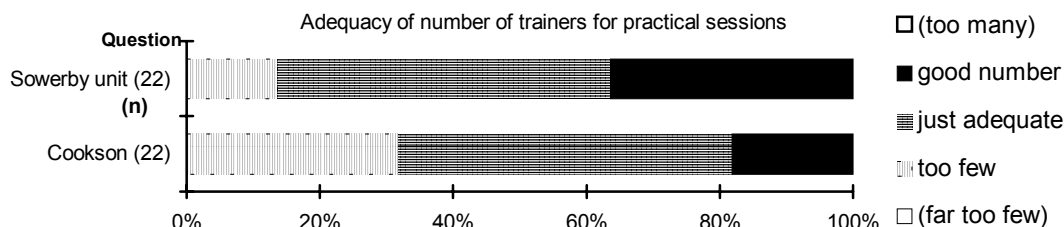
The four respondents who specified 'other' suggested one or more of the following:

- *'Presentations'*
- *"Advice on buying software'*
- *Communication between primary / secondary care and Epi Info*
- *SPSS + 'SPSS / Basic statistics theory + examples'*

The most common type of request for topic areas to be included in a follow on course were those related to querying data and database development. Data presentation techniques and the Internet were also important areas. In contrast the use of computers in the consultation and coding were of least interest. This is probably a reflection on the fact that the respondents were hospital doctors rather than GPs. GPs use computers frequently in the consultation and coding is their direct responsibility. This finding emphasises the important of developing separate courses for individuals in different organisations where roles differ significantly.

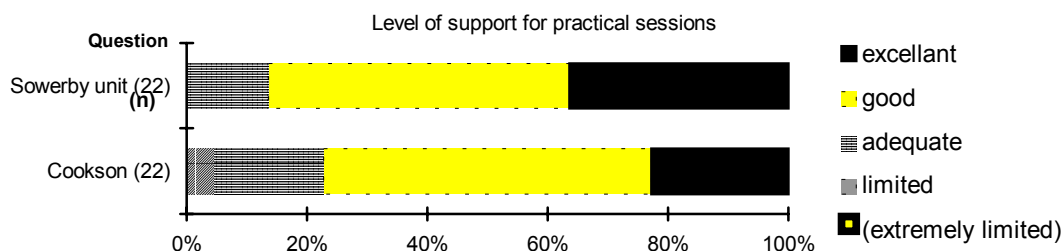
5.3.13 Practical sessions

The practical sessions were run by two teams, the Cookson computer unit and the Sowerby unit. In the needs assessment questionnaire two respondents expressed concerns about the possible level of support that might be offered during such sessions. At the end of the course participants were asked to comment on various aspects of the practical sessions including the adequacy of the number of trainers available.



The level of support offered was approximately 1: 10 students for the Cookson sessions and 1:7 for the Sowerby unit sessions. The above results stress the importance of adequate cover during practical sessions.

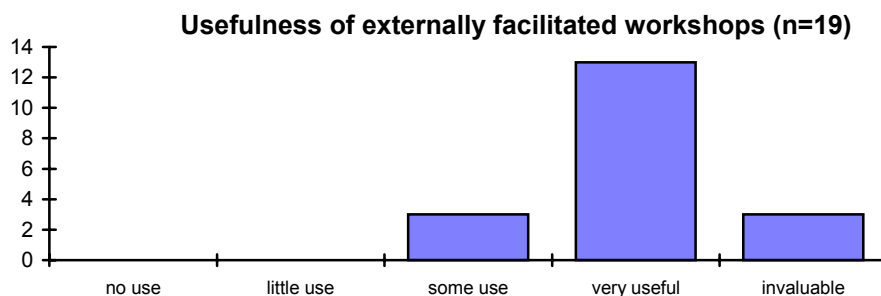
The participants were also asked to rate the overall level of support offered during the practical sessions.



5.3.14 Externally facilitated workshops

During the course two half day workshops were run by visiting clinicians who had an interest in information systems (HIS and departmental clinical systems). These workshops contained a significant amount of group work being near the end of the course when participants had begun to assimilate the information provided earlier and could engage in informed dialogue.

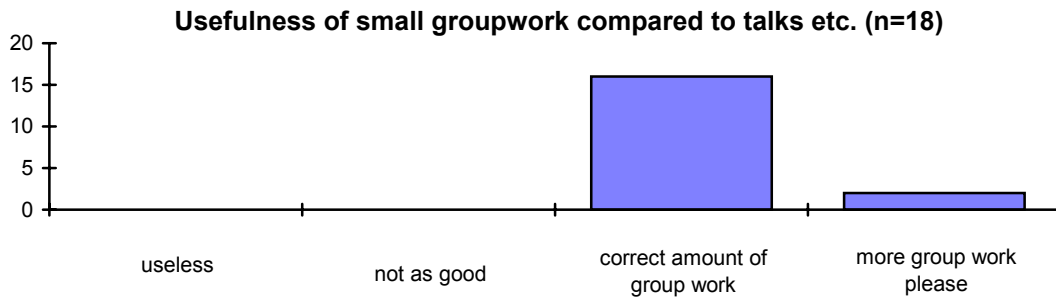
Participants were asked how useful they would rate the two workshops run by visiting clinicians:



Possibly the success of these sessions was due to the clinical input, highlighting Di Millans' importance placed on clinicians training clinicians (see section 4.3.1 - rationale) however see the following sub section - 5.3.16 Lack of Importance of medical training for course leader - which presents conflicting results.

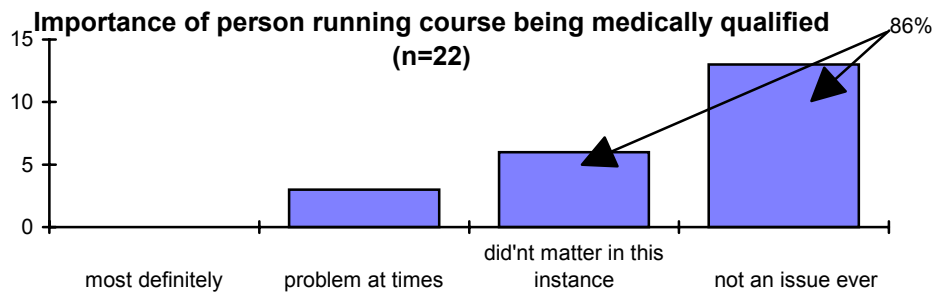
5.3.15 Usefulness of small group work

Participants were asked how they rated the format of the small group work sessions compared to that of the talks:



5.3.16 Lack of Importance of medical training for course leader

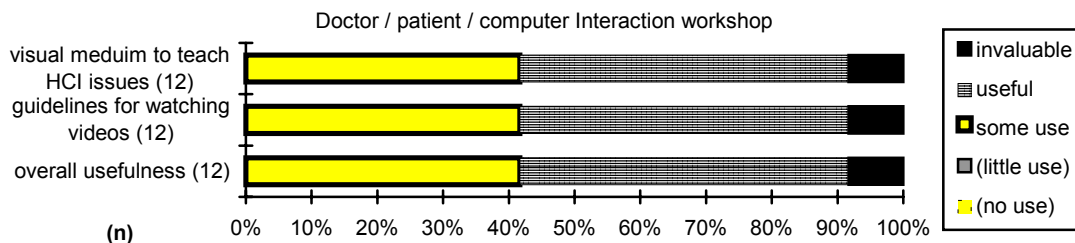
Respondents were also asked directly how important they felt it was for the course leader to be medically qualified



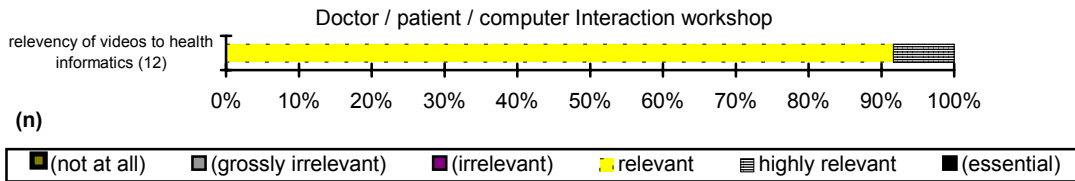
A statistically larger proportion of respondents felt that it was unimportant for the course to be run by someone who was medically qualified ($\chi^2 = 11.63$, $df=1$, $p=0.0006$). However this result must be treated with caution because while the present course leader was not medically qualified they had an extensive nursing background including nurse education. In retrospect a more useful question would have possibly been 'how important would it have been for the person leading the course to have had some CLINICAL experience?'.

5.3.17 Doctor patient computer workshop

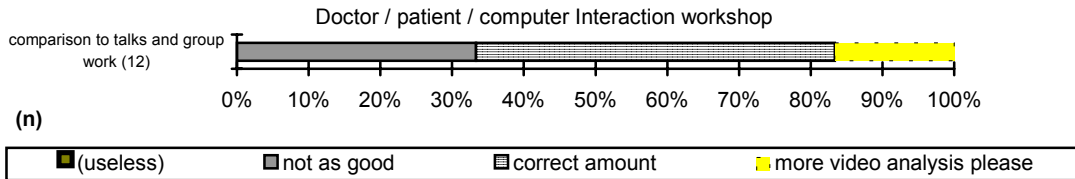
As part of the pilot course a half day was devoted to a video workshop investigating the issues around using a computer during the consultation. Unfortunately only ten of the 22 participants who completed the evaluation questionnaire had attended the video workshop. They were asked several questions concerning the session.



They were also asked how they would rate the relevancy of the videos to the subject area of the course i.e. health Informatics:



They were also asked how would they rate the use of the video analysis sessions compared to that of the talks and group work:



The above results would suggest that most of those who attended the session felt it to be relevant to the subject area and enjoyed the change of format.

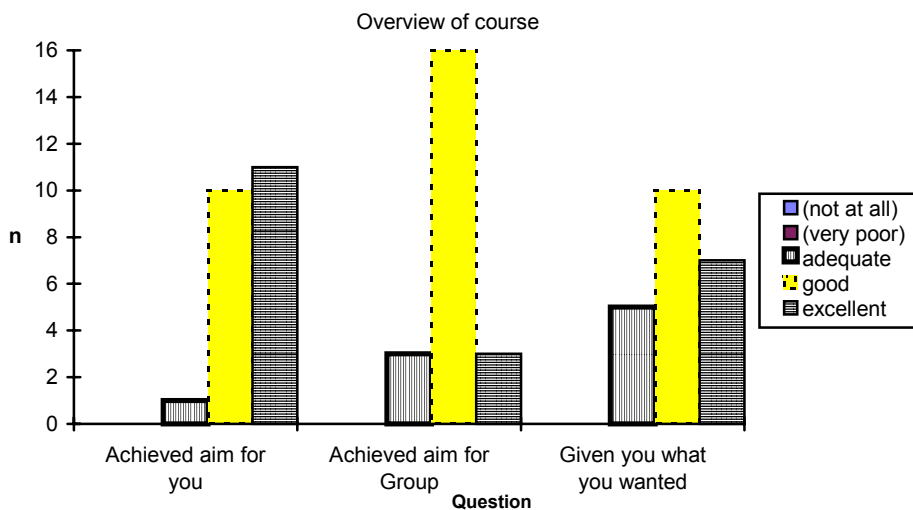
5.3.18 Overview of course

In addition to the detailed questions described in the previous sections the participants were also asked to provide a rating of the overview of the course. The results are given below. It should be noted that often such 'overview' questions detract from the more useful and realistic detailed data described previously.

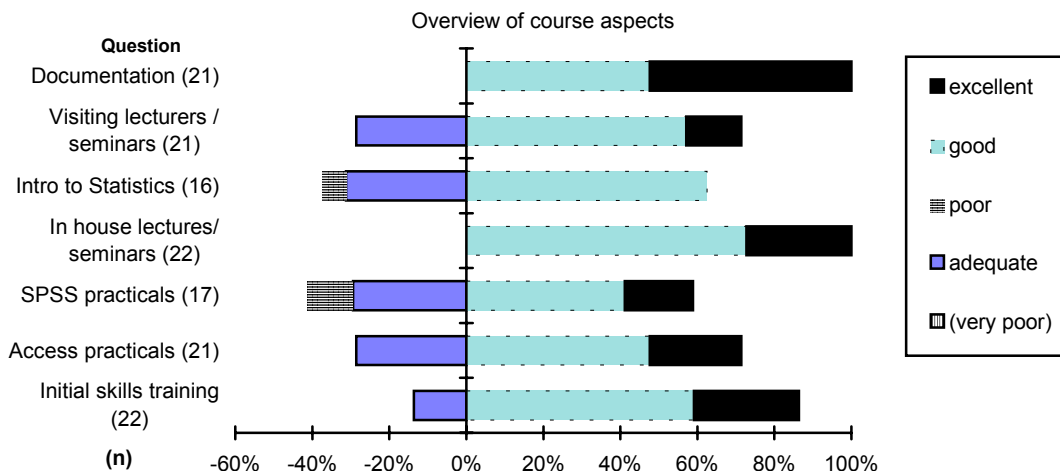
Respondents were asked to read the following statement providing an overview of the aim of the course:

"The aim of the course was to provide a 'feel' for Informatics. This was achieved by presenting a wide range of topics along with additional in depth written material for further study if so desired by individuals on the course."

They were then asked the three questions listed along the x axis in the bar chart below.



Respondents were also asked to provide an overall rating for the seven aspects of the course listed below:



The two that scored to lowest, Introduction to statistics and SPSS practicals were also those that respondents wished had had more time devoted to them (see previous section for details).

5.4 Summary

Given the limitation of the small sample size it is still possible to draw some internally valid conclusions from the results presented above. Only statistically significant conclusions are given below.

Respondents were willing to pay personally approximately one tenth the actual cost of the present course or a future follow on course.

The course was rated to be invaluable to respondents when they become consultants.

Four fifths of respondents felt they had significantly / vastly increased their HI skills and knowledge.

Changing the format to 12 evening sessions was considered to be unacceptable.

Changing the format to that of a open learning course was considered to be unacceptable.

Technological support of some kind was considered not to be a suitable substitute for some face to face contact.

Access to a computer was considered to be necessary / essential for the course.

While development of news-groups, bulletin boards or a web site were not considered to be desirable by a larger proportion of respondents possession of a laptop was.

More emphasis on self learning techniques or site visits were not considered to be desirable by a larger proportion of respondents while two methods (personal tutorials and small groups) of increasing face to face contact were.

For the present course respondents expressed a desire for more SPSS, statistics, systems design & information management techniques, word-processing, Excel and Internet education.

For a follow on course respondents expressed a decreasing desire for, education in QBE (and SQL less so), specifying + developing databases, computerised audit, presenting data graphically, the Internet, specifying requirements and liaising with the IM&T department. The least popular topic areas were decision support, computers in the consultation and coding and classification.

A larger proportion of respondents felt that it was irrelevant if the course leader was medically qualified.

Workshops run by local clinicians and the doctor / patient / computer workshop were considered to be useful / invaluable.

6. Evaluation workshop

6.1 Format and methods

After completion of the course all course participants were invited to a half day evaluation workshop (June 4th). Letters were also sent to the four learners who were unable to complete the course. The programme for the day is given below:

12.30 - 1.50	Lunch (Post graduate common room)
2.00 - 2.20	Introduction to evaluation - thoughts so far!
2.20 - 2.50	Group exercise (1)
2.50 - 3.05	Feedback
3.05 - 3.25	Tea
3.25 - 3.40	The vision
3.40 - 4.00	Group exercise (2)
4.00 - 4.15	Feedback
4.15 - 4.45	General discussion with Nottingham evaluation team
4.45 - 4.50	Close
4.50 - 5.15	Completion of evaluation questionnaire

The external evaluation team took part in the event.

Details along with results of the group work sessions are provided below.

6.2 SWOT analysis of present course

Group session (1) SWOT analysis for the present course

SWOT stands for Strengths, weaknesses, opportunities and threats.

Choose someone to write down key points on the flip chart.

Choose someone to present the key findings.

Time allocated: 30 minutes.

Task:

Divide the flip chart into four areas, each area being one of the above SWOT aspects.

Consider not only the present course from a participants perspective but also the universities, professional bodies and hospitals perspective.

When considering the weaknesses and threats of the present course suggest how the problems you identified might be overcome.

Finish off by choosing the three greatest strengths and weaknesses of the present course.

The results of the above task for the four groups are presented overleaf:

Pilot Course - Introduction to Health Informatics for Specialist Registrars

Group 1			
Strengths	Weaknesses	Opportunities	Threats
Eyeopener Extend existing skills Awareness of range of computers Jargon! → communication Course notes to go back to Introduction to hospital systems New skills for department Improve quality of research Variety of Software used	No laptop - can forget if can't practise Theory - difficulty with concepts Dedicated time to prepare/revise Recap/revision would be useful at next session Information overload in some areas Loss of 6/7 work days time	Confidence - use other software - use skills Knowledge → keen to use clinical systems in future & argue for them Able to contribute to decisions about clinical systems Database skills for research/presentations etc. - may save money & improve quality Pass on skills to others in dept Income generation by running courses!	Cost of computer systems etc. we might argue for Less control for IT/computing department Technology obsession Marital disharmony Technology obsession
Group 2			
Strengths	Weaknesses	Opportunities	Threats
Robin's enthusiasm Broad spectrum of specialities Applicable to all levels of competence Increased awareness of IT and management issues Provided overview but also a good grounding in use of software	Lap top PC's would have been useful Initial sessions were a little abstract Particularly access tutorials (not enough follow up) Delay in receiving log on numbers	Increased awareness Greater ability to seek appropriate advise and solve problems Importance of controlling it rather than it controlling you	Time Rainforests (lots of handouts) Initial lack of computer skills
Group 3			
Strengths	Weaknesses	Opportunities	Threats
Good discussion Teaching friendly & non-formal/ approachable Covered a wide area Time to assimilate knowledge Access to computer/practical sessions Lot of background information	Lack of computing facilities outside course - no lap tops Lack of ability grouping Time constraints in computer practical → no time to appreciate what we were doing Decision trees session poor	Knowing where to ask for help e.g. database e.g. stats - an idea of how Clinical systems could work	Can't apply philosophy therefore may become disheartened Computers taking over clinicians role?
Group 4			
Strengths	Weaknesses	Opportunities	Threats
Comprehensive course material Enthusiastic staff/presentation Broad base theory/practicals Convenient location/time	Assumes background knowledge should have had split groups Delay obtaining- log-on no. Initial lack of overview - aims - objectives	Increase quality of research Department administration Future involvement in planning services - "informed" Bargaining power	IT departments Colleagues expectations unrealistic now from us Computer junkie?! Financial!

6.2.1 Unrealistic exceptions from those completing course and problematic wide range of abilities

Two anxieties were voiced during the session. Several learners felt that unrealistic expectations were being placed upon them from colleagues and department heads after they had completed the course. They felt they were supposed to be 'gurus' after the course rather than more realistically gaining a broad introduction. The other anxiety concerned the wide range of prior abilities demonstrated by learners at the beginning of the course. This was voiced in two ways, firstly several of those at the top end of prior experience felt they could have got further in the 6 days while those at the bottom end of prior experience felt the speed of the course was too great.

6.3 SWOT analysis of proposed improved course

The second group-work exercise consisted of carrying out a SWOT analysis of a proposed improved course.

Group session (2) Swot analysis of the proposed improved course

Choose someone to write down key points on the flip chart.

Choose someone to present the key findings.

Time allocated: 15 minutes.

Task:

Divide the flip chart into two areas then:

Green and yellow groups - consider opportunities and threats.

Pink and lilac groups - consider strengths and weaknesses.

Things that you might want to consider:

different ways of running the course -	distance learning over the Internet weekends evenings
content of course	more / less practicals
marketing course	how - likely success
Extra resources you would like	????

Finish off by listing the three things you would most likely and least likely to see happen to the course.

Thanks for attending this day and taking part in this evaluation workshop.

The results from this exercise have been incorporated into the proposals for a new course discussed elsewhere in this report.

6.4 Summary

The evaluation workshop provided a valuable opportunity for interaction between the learners, the course leader and the external evaluation team.

The pilot course was considered to have been a success for most of the learners who attended the day (22 attendees). They also appeared to be in general agreement concerning the proposal for the improved course.

The stresses of unrealistic expectations from colleagues and line managers placed upon those who had attended the course and the very wide range of prior computing skills exhibited by those on the course were identified as problems.

7. Progress reports

The Newcastle pilot site was required to produce two progress reports during the course. Abstracts from these are provided below. The e-mail distribution list is provided in the appendix.

7.1 Abstracts

Newcastle Course update (after day 2 of 6). Just to let every one know how its all going after the second day:

Megans session on intro to computing skills went well (Excel and WWW). The first Access session went extremely well (expected as 80% of them had this down as there reason for attendance). For most people this was clearly the high point of the day despite the fact that it was the last session! Because one of their concerns was lack of support during practical sessions I arranged three facilitators (1 to 6-8 student staff ratio) to be there. I felt at the end of the session this was about the right level.

Several who had attempted, and failed to develop databases in the past mentioned how they had now realised the importance of object modelling. One mentioned the problem that you do not realise the importance of object modelling until you have developed a database and failed. If we had time it would have been nice to adopt this approach with a set of exercises.

The systems development side, looking at iterative prototyping and ETHICS as a socio-technical approach went well. Many of them managed to relate this to real world examples, re. development of local clinical systems. Liked the idea that job satisfaction / enhancements used as the prime motivator for change in this method.

The systems analysis side (dynamic aspect this time) went better than the first day. Most likely because some had read through the material before hand. - every page has clinical examples. The idea of using it to analyse and develop business processes (BPR) in the clinical situation attracted several of them.

The social issues side of things concerning the consultation and pattern recognition they found interesting. A nice building block for the video session planned latter.

Because of the needs assessment results I asked them what they wanted to know about 'research'. Nearly all said statistics and research design so I intend to re-jig some of my old lecture notes for a optional additional session, basically to keep them happy and it will provide some background for the final days work on SPSS. I assumed, obviously wrongly, that most would know when to do a parametric or non parametric test and know the difference between independent and dependent data etc.?

I gave a short feedback of the needs assessment results. And went over the definitions, terms etc. went well.

Laptops - There does seem a problem with not laving any laptops. I feel there is definitely one or two who would greatly benefit.

Homework - I think this may be a problem if the course does not have some form of assessment / accreditation. Clearly it is necessary as it is impossible to cover all the essential material and to get them to develop any level of skill proficiency in various techniques just within 6 days.

Attendance - 6 people had informed me they were on holiday. I'm arranging a separate session for them next week.

Drop outs - Two so far. Two paediatricians have since got consultants jobs, came the first day but their boss will not allow then the time out. Down to 28 now.

Overall I think the second day was much more of a success than the first day. Possibly the fundamentals (informatics theory etc.) should come at the end. I think it certainly caused undue stress.

Newcastle Course update (after day 6). Just to let every one know how its all going.

Dear all having just completed the last day of the course, I feel there is much I've left out. However it was a start. The last two days of the course seemed to have a tailing off of attendees, most of them gave reasons such as clinical commitments and preparing for professional exams. Also informally talking to several of them it appeared that the change in emphasis to more 'social issues' (such as the HCI issues with the video stuff; and the HISS /clinical systems developments) in the last two days from skills based stuff may have been partly to blame. Anyway I might discover this to be completely wrong when I get the evaluation questionnaires back, generalising a few atypical moans.

The last day did have some skills development in it with a quick tour of SPSS for windows, using it to do EDA some simple significance tests and a short intro. to survival analysis. As predicted they all really enjoyed it, particularly the intro. To survival analysis, couldn't believe how easy and useful, it is to draw a survival curve. I also gave then a 0.5 hour session on statistics and calculating sample sizes (mainly using Gpower and mentioning Epiinfo). I was amazed at their lack of basic knowledge, NONE of them knew anything about levels of measurement (nominal/ ordinal etc.), the difference between independent and paired designs and the relationship between the null and alternative hypotheses to a statistical test. No wonder they have problems with very basic statistics. They clearly wanted a lot more, and several said they had been completely converted from Minitab to SPSS by the end of the session.

7.2 Summary

As emphasised elsewhere in this report great care must be taken when considering the above data and it is hoped that readers of this report will read the above abstracts with the questionnaire results being given far more emphasis. They are really nothing more than my personal jottings, including personal prejudices.

8. Way forward for Newcastle

8.1 introduction

The evaluation results presented earlier in this report have paved the way for the rationale strategic development of health Informatics courses for SpRs at Newcastle. This chapter presents a detailed plan for proposed action for the next year.

8.2 Aims

The following aims have been identified in shaping the way forward:

- Develop a HI teaching infrastructure for SpRs'.
- Build on experience gained from the pilot
- Build on existing Medical school infrastructure (library, training the trainers, Cookson computer unit etc.)
- Develop a long term sustainable strategy
- Optimise attendance (non attendance penalties, whole days as study leave, preferred format, rotating days of week, piggy backing courses)
- Maintain close cohesion between theory and practical skill development
- Maintain 'clinical' perspective (visiting clinicians workshops)
- Accept and maintain importance of face to face contact
- Develop strategies to increase homogeneity within groups of learners regarding prior HI computer skills
- Increase SPSS and practical statistics component of course using HES data to increase hospital clinical relevancy of data.
- Use a modular approach to development
- Consider the possibility of CATS (credit and accumulation scheme)

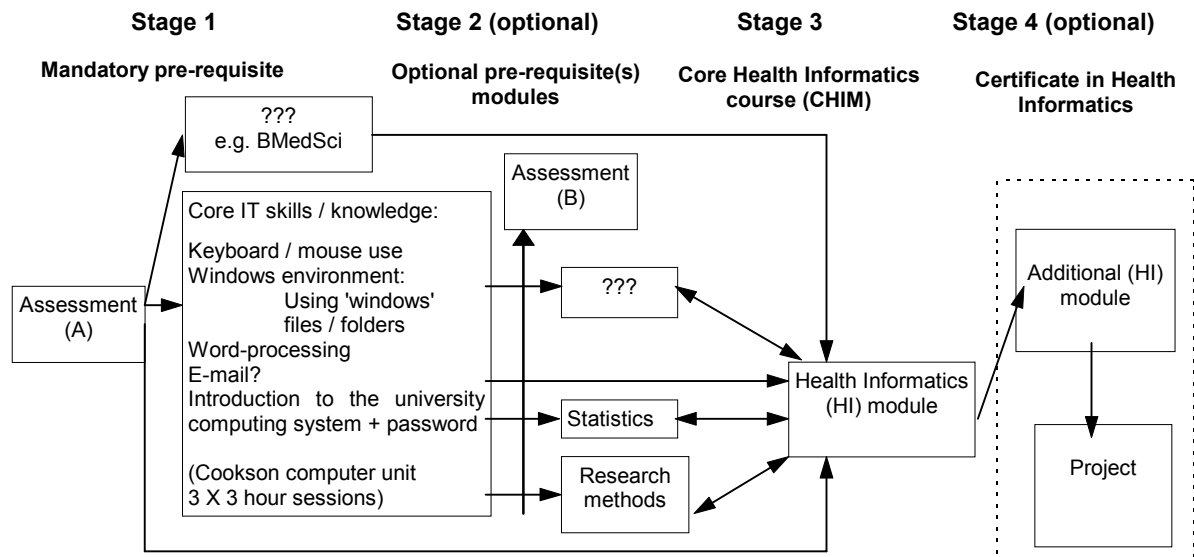
8.3 Four stages of HI education for SpRs

The single stage pilot course was seen in retrospect as being problematic in terms of consisting of students with a very wide range of abilities. It is proposed that it is replaced with a four stage process. The pilot course being effectively divided into:

- Core IT skills / knowledge
- Dependent professional knowledge / skills (i.e. research methods / statistics)
- Core Health Informatics Module (CHIM)
- Certificate in Health Informatics (optional)

This is shown graphically below.

The progression of a SpR student in terms of HI knowledge and competencies is seen as a four stage process. The stage 2 in the diagram below represents a set of modules still to be defined in detail but represents those areas of knowledge / skills that are required by CHIM but not a major part of it, further details are given below. It is planned that all SpRs will complete to stage three and a small number will go on to stage 4. In future years the possibility of extending this will be investigated. It is proposed that students undertaking the CHIM should possess certain skills and knowledge. These are detailed below.



8.3.1 Core IT skills / Knowledge course

It is proposed that all those who undertake the CHIM should possess a minimum level of Core IT skills / knowledge. These will be assessed before learners undertake the core IT skills / knowledge course to determine which part, if any, of the Core IT skills / knowledge course they need to attend.

The core IT skills / knowledge will consist of approximately 1.5 days of material. The course will introduce learners to the university facilities and to ensure that they possess a university password, teach them how to use the windows environment correctly, gain word-processing skills and correct data backup techniques etc. This course therefore fulfils a similar function to that of the introductory IT course set up for undergraduates in any university faculty. It provides learners with generic skills such as work processing and e-mail required by all the other modules they subsequently undertake.

8.3.2 Optional pre-requisites

Areas of the proposed HI course assumes that participants also have a basic knowledge of statistics and research methods. Dependent upon the background of the individual it will be appropriate for them to undertake the modules providing a basic introduction to statistics and research methods first. However, for others it would make little difference which way round they completed the modules. An individual assessment would be undertaken. For others, such as those who have undertaken a BMedSci these pre-requisites would not be applicable.

As a stop gap before, or if, any taught courses for these subject areas are developed it is proposed that various open learning resources are utilised. Some examples are given below.

Some excellent open learning material for teaching statistics is already available in the fell cluster (Statistics for the terrified as part of the ITTI at St. Bartholomew's hospital medical college) as well as the appropriate statistical software. The WEB has several open learning sites concerned with statistics, including one in Newcastle:

<http://frey.newcastle.edu.au/Stats/surfstat/surfstat.html>

<http://www.helsinki.fi/~jpuranen/links.html#stc>

<http://math.yorku.ca/SCS/StatResource.html>

The WEB also has several sites offering an introduction to the appropriate research methods (see <http://olam.ed.asu.edu/~glass/502/home.html>)

8.3.3 Core health Informatics course (CHIM)

This will be a 7 day course (six compulsory days , and an additional optional day). Further details are provided in subsequent sections.

8.3.4 Certificate in Health Informatics

This will comprise of two modules. One module will consist of taught sessions whilst the other will be assignment based. Further details are provided in a separate proposal document detailing the course.

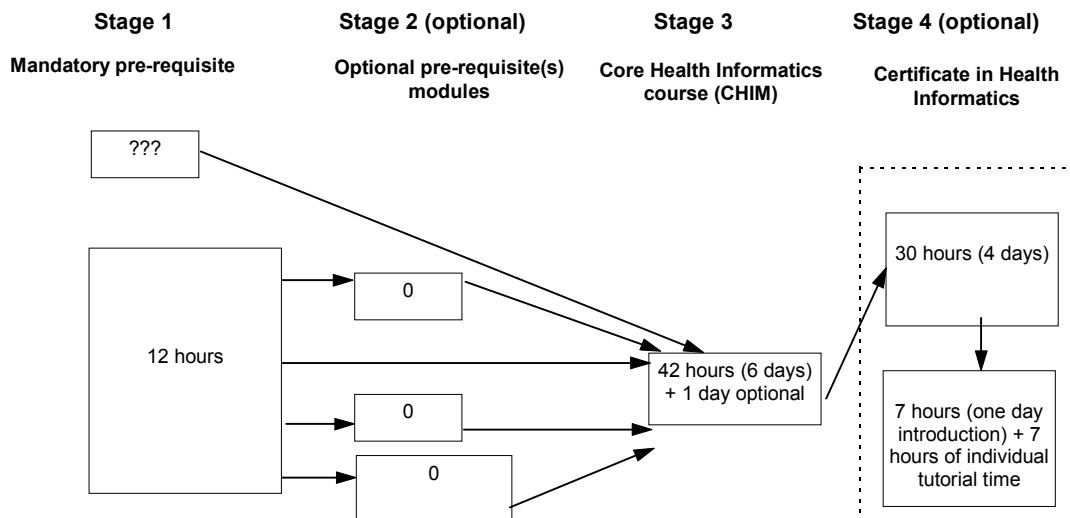
8.4 Student workload

Newcastle Medical School faculty recommended contact time for a Postgraduate module is 30 hours. This can include a negotiable proportion of student directed activity (source prof. Burt 20/05/97). There is no recommended number of student work hours for a PG module. This compares with 24 hours lectures + 12 hours tutorials + laboratory activity for an undergraduate module expecting the student to be working in total for approximately 100 hours (source Jane Mann 15/05/97). Three PG modules form a certificate, 12 PG modules a diploma and 18 (6 being a dissertation) a MSc. This compares with 12 modules per year for undergraduate courses.

The above information has been taken into account in the following proposals for student contact and workload hours.

8.4.1 Student contact time

The number of hours a student will be in contact with a lecturer / teacher / facilitator is given below:

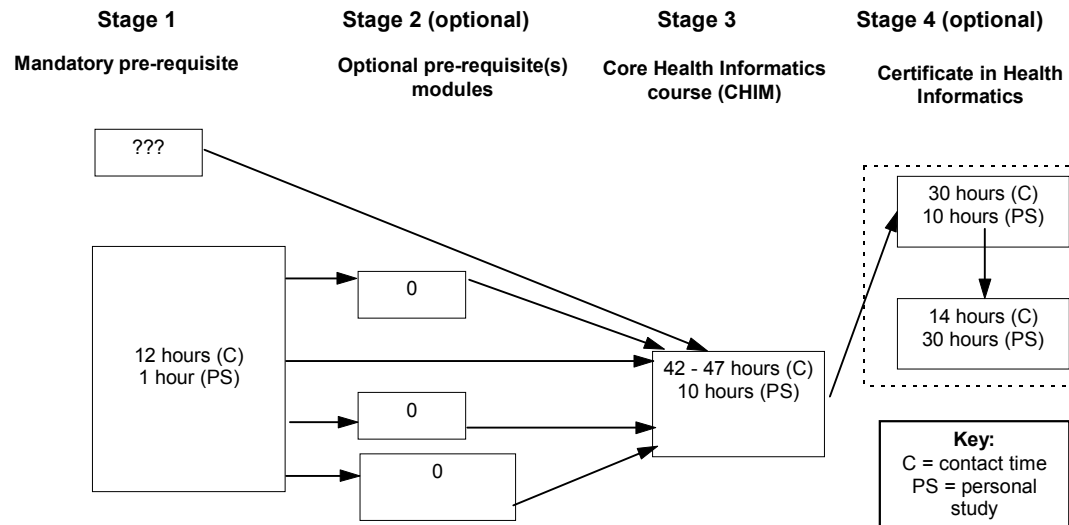


It should be noted that the student contact time for several of these elements may vary dependent upon the individual. For example not all individuals will need to complete the entire core IT skill / knowledge course. Also it is proposed to provide an optional additional days teaching concerned with analysing PAS (MDS) data in the CHIM.

Considering the above factors the average SpR student will receive 50 to 60 hours IT / health Informatics teaching during their training. A smaller proportion will choose to attend the two additional modules to obtain a certificate in HI in which case they will have received approximately 100 hours of teaching.

8.4.2 Personal study

The indicative workload for a typical student is given below.



Personal study for the CHIM will consist of background reading (provided as part of the course material) and completion of computer practicals for those who fail to do so in the timetabled session. For those wishing to move on to the certificate an assignment will also be set.

8.5 Funding

It is proposed that the modules are funded in the following manner:

- Stage 1 SpR training (Initial and ongoing maintenance cost of software and ad hoc support need to be considered).
- Stage 2 Dependant upon module .
- Stage 3 SpR training with a small proportion of self funding to encourage attendance. See costings session.
- Stage 4 Student self funding but classed as study leave.

Detailed costings for stage 3 form part of this document.

8.6 Summary

This chapter has presented a proposal for development of a HI strand within SpR training. It is seen as a four stage process, of which the first three are mandatory, by the end of which all learners will have gained basic HI knowledge and skills. While this chapter provided an overview of each of the stages the following chapter provides a detailed description of the proposed Core Health Informatics Module (CHIM).

9. CHIM

9.1 Introduction - Aims

The aim of the CHIM is to provide a general introduction to Health Informatics in terms of both knowledge and supportive skill development. The teaching strategies employed will facilitate a problem based approach to learning and support students in developing pro-active learning skills.

9.2 Overview

Important characteristics of the Core Health Informatics Module (CHIM) are given below.

Pre-requisites	Discussed above
Post-requisites	None at present
Level / accreditation	Part of SpR training. No formal qualification obtained. However will contribute to a certificate in HI if the additional modules are undertaken within a reasonable period of time
Duration	6 days mandatory + 1 optional day over a three - four month period
Attendance	A letter from the participants consultant will be required to indicate she/he has agreed to the commitment. The student will sign a standard learning contract which will include a non-attendance penalty clause (see below)
Non-Attendance penalty	Each student will personally agree to pay a maximum of 120 pounds before the course as a penalty for non attendance (£20 reduction for each day attended) i.e. those that attend all the days will pay nothing. This method is effectively used by pharmaceutical companies to maximise attendance. Valid reasons for non attendance will be accepted ¹⁰
Fee	None for the student. See section - costings
Maximum number	38 ¹¹ students will be enrolled
Course dates	It is proposed to run the course 4 times a year
Study leave	The days will be classed as study leave or research days
Assignments / projects	None for the vast majority of participants. Those wishing the carry on to the certificate will need to undertake an assignment.
Computer access	Participants should have access to a suitable PC during the course or be prepared to visit the Fell cluster to complete computer practical exercises if necessary ¹²
Teaching methods	Lectures, workshops, seminars, presentations by practising clinicians, student presentations

¹⁰ Another suggestion is that those who fail to attend do not get 'signed up' for SpR training.

¹¹ Originally it was proposed to run the course three times a year with 50 participants, running each day twice. However this would result in the Fell computer cluster being used 42 days a year. In contrast this arrangement uses the fell computer cluster for 28 days.

¹² Ideally it would be appropriate to have a 'bank' of laptops to provide to students who do not have access to computer facilities on site or are felt to have a specific need for the opportunity to practice basic keyboard skills. The actual proportion of learners which would benefit from this is not known although it was a popular request in the evaluation questionnaire. Access to computer facilities needs to be accessed and monitored. See appendix - Anaesthesia computer access questionnaires.

9.3 Course process

The course can be considered as progressing through a number of steps:

step 1 - Check necessary prerequisites. I.e. that all candidates have completed the basic IT knowledge / skills questionnaire (A) and completed the basic IT knowledge / skills course or some other suitable course. If they have not process accordingly. ***This step may be undertaken by those who administer the basic IT skills / knowledge course (i.e. Cookson clinical computing unit).***

step 2 - Candidates ranked according to suitability / priority (length of time having been a SR etc.). Waiting list letter sent out to those who are unsuccessful.

Successful candidates:

step 3 - Following documents sent out: Assessment questionnaire (B) - basic statistics / research methods knowledge. Pro forma letter for consultant to sign. Attendance penalty agreement and learning contract for student to sign.

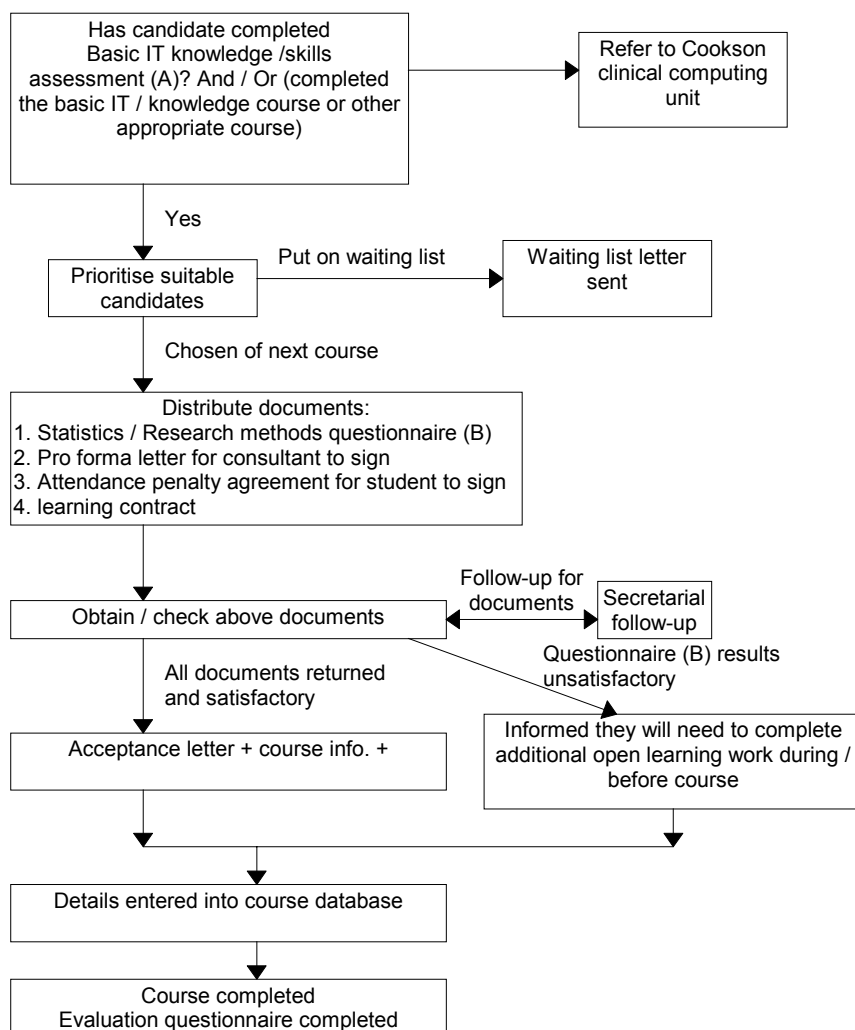
step 4 - Administrative follow-up and questionnaire (B) results analysed.

step 5 - Acceptance letter, course information (including dates) and optional letter informing those who obtained an unsatisfactory questionnaire (B) result the need for studying the additional sessions / open learning material.

step 6 - 6 -7 full days of education - details provided below in timetable section.

step 7 - CHIM Evaluation questionnaire administered, collected and analysed.

The steps are shown below:



9.4 Learning Objectives

The learning objectives are presented below from the participants perspective, technical equivalents are available from the author.

To understand how various methods of information collection, processing and retrieval can enhance professional performance.

To gain practical experience in the use of technology that supports information collection, processing and retrieval.

To gain some experience in the methods used for specifying the characteristics of required information.

To develop an awareness of the methods used to evaluate various methods of information collection, processing and retrieval.

To gain knowledge of how information specification, management and retrieval along with supportive technologies affects the organisation.

9.5 Main Topic areas running through the CHIM

The CHIM has several topic areas running through the days. These are:

1. Psycho-Social Issues
2. Clinical software applications
3. System design / evaluation
4. Human computer interaction (HCI)
5. Skills

The specific sessions that cover each of these topic areas are listed below:

Psycho-Social Issues	Clinical software applications	System design / evaluation	Human computer interaction (HCI)	Skills
Coding / classifications HRGs Data / information / knowledge - informatics Socio technical approach Information centres Forging links with IM&T departments Confidentiality security Social models of information (panoptican etc.)	Access - demonstration + exercises HISS - workshop Audit system - workshop Decision support	Object models Dynamic models Life cycles /Methods Evaluation Socio technical approach	Consultation - video workshop Good practice Task analysis Evaluation	Access Excel SPSS Powerpoint MDS analysis

9.5.1 Psycho-Social Issues

This topic area considers the relationship between data / information / knowledge and Informatics. The uses, and abuses of coding / classifications and HRGs will be demonstrated. At a higher level a method, Enid Mumfords Socio-technical approach, will be introduced. This method places emphasis on professional development and job satisfaction when considering systems development. The opportunities for developing more effective links between clinicians and IM&T departments will be introduced by way of discussing the information centre concept and case studies.

Inherent in all these above topics will be the professional requirements of the clinician, constantly raising the issues of professional responsibility, confidentiality and data security.

9.5.2 Clinical software applications

The course aims to introduce real world examples wherever possible rather than ethereal concepts. Furthermore practising clinicians who are actively involved in such developments will be used to introduce and discuss them. The HISS system at Sunderland DGH and a Rheumatology Audit system will provide two half day workshops. A health economist will also introduce a method of decision support frequently used.

9.5.3 System design / evaluation

The necessary cognitive skills required to enable clinicians to effectively engage in dialogues with IM&T professionals will be taught. This will include, Object modelling, Dynamic modelling (along with the concept of Business process re-engineering), System development Life cycles and Methods and Evaluation. These cognitive skills will also provide a firm basis for those wishing to start developing their own systems in liaison with the IM&T department(s).

9.5.4 Human computer interaction (HCI)

Several prepared videoed scenarios will be used to demonstrate the effect the introduction of a computer has upon the consultation. The workshop will also introduce several scales that have been developed to measure this aspect of the consultation.

9.5.5 Skills

The findings of the pilot project clearly demonstrated the importance of including a large element of hands on experience in any course. In all probability a course which failed to offer this type of experience would be evaluated very poorly by any clinician. However from an academic viewpoint it is important to ensure that practical sessions reinforce cognitive concepts introduced elsewhere in the CHIM. Therefore the Access practicals will demonstrate database concepts, importantly those of data query. The Excel practical will demonstrate how graphics can be easily incorporated into textual documents as well as graphical methods of exploratory data analysis (EDA). Further methods of data analysis will be demonstrated in the SPSS sessions using both small research data sets and larger operational data sets (MDS). Finally important aspects of good presentations using a computer will be succinctly demonstrated in a Powerpoint workshop.

9.6 Dates of courses

To maximise attendance two courses will run almost in parallel. Two commencing in November and two in February. In certain circumstances learners will be allowed to switch days between cohorts 1 and 2 or 3 and 4. Furthermore the day of the week will vary to allow more clinical flexibility. Details are given below.

9.6.1 Cohorts one and two

Day	one	two	three	four	five	six	seven	eight	nine optional
Mon	1		2		1		2		
Tuesday	2		1		2		1		1
Wednesday								1	2
Thursday		1		2		1		2	
Friday		2		1		2			
1= cohort one; 2=cohort two									

day	date (cohort 1)			
1	3rd	Nov	1997	Monday
2	4th	Dec	1997	Thursday
3	6th	Jan	1998	Tuesday
4	23rd	Jan	1998	Friday
5	2nd	Feb	1998	Monday
6	19th	Feb	1998	Thursday
7	3rd	March	1998	Tuesday
8	18th	March	1998	Wednesday
9 (optional)	31st	March	1998	Tuesday

day	date (cohort 2)			
1	4th	Nov	1997	Tuesday
2	5th	Dec	1997	Friday
3	5th	Jan	1998	Monday
4	22nd	Jan	1998	Thursday
5	3rd	Feb	1998	Tuesday
6	20th	Feb	1998	Friday
7	2nd	March	1998	Monday
8	19th	March	1998	Thursday
9 (optional)	1st	April	1998	Wednesday

9.6.2 Cohorts three / four

Day	one	two	three	four	five	six	seven	eight	nine optional
Mon	3		4		4			3	
Tuesday	4		3			3		4	
Wednesday				3		4	3		4
Thursday		3		4	3		4		
Friday		4							3
3= cohort three; 4=cohort four									

day	date (cohort 3)			
1	9th	Feb	1998	Monday
2	26th	Feb	1998	Thursday
3	10th	Mar	1998	Tuesday
4	25th	Mar	1998	Wednesday
5	2nd	Apr	1998	Thursday
6	21st	Apr	1998	Tuesday
7	6th	May	1998	Wednesday
8	18th	May	1998	Monday
9 (optional)	5th	Jun	1998	Friday

day	date (cohort 4)			
1	10th	Feb	1998	Tuesday
2	27th	Feb	1998	Friday
3	9th	Mar	1998	Monday
4	26th	Mar	1998	Thursday
5	30th	Mar	1998	Monday
6	22nd	Apr	1998	Wednesday
7	7th	May	1998	Thursday
8	19th	May	1998	Tuesday
9 (optional)	3rd	Jun	1998	Wednesday

9.7 Detailed timetable

The following pages provide details of the course at the individual session level.

Several timetables are provided the original one presented as part of the proposal and modified versions following discussions with various stakeholders.

9.7.1 Glossary

Cohort	One of four sets of students undertaking the course. It is planned for each group to contain 38 learners. The start dates for the four planned cohorts are: 3rd Nov. '97 (cohort 1), 4th Nov '97 (cohort 2), 9th Feb. '98 (cohort 3), 10th Feb. '98 (cohort 4).
Group	A subset of a cohort. For example each cohort will be divided into three groups, consisting of around 13 learners to facilitate teaching the library session.

9.7.2 Detailed Timetable (Technical perspective) Original proposal

Time	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
9 - 10	Overview of health Informatics	Object models and the relational database	Getting information out of databases	Dynamic models and analysing clinical processes	Information systems as social systems (3) HCI and Clinical method (group exercise with video)	SPSS	Using SPSS to analyse the CMDS
10 -11	Data, Information, knowledge , wisdom and databases	Database practical (2) Relationships	Database practical (4) Queries	Database practical (5) Getting information from linked tables			
11.10 - 12	Library introduction						
12 - 12.50	Library on line search demonstration	Systems development methods	Information systems as social systems (2) Information centres	Databases - What we have learnt so far. Developing your own	HCI Evaluation methods	Data available in the NHS	
Lunch							
1.30 - 2.30	Excel	Database practical (3) Creating a form	Decision support - a demonstration of decision trees	HISS workshop	Database practical (7) complex queries + exporting data Practical: Presentation software	Audit system workshop	Student selected topics
2.30 - 3.20	Objects and tables	Information systems as social systems (1)	System evaluation				
3.30 - 4.30	Database practical (1) Table definitions Data entry	Practical: WWW - HTML newsgroups	Classifications etc! ?practical	(4pm) Database practical (6) summary Queries		(4pm) course review	
5.00 - 6.00 optional session	Intro to statistics and research methods (attendance dependent upon results of questionnaire (B)) or advanced word processing / graphing	Intro to statistics and research methods (attendance dependent upon results of questionnaire (B)) or advanced word processing / graphing	Intro to statistics and research methods (attendance dependent upon results of questionnaire (B)) or advanced word processing / graphing	Intro to statistics and research methods (attendance dependent upon results of questionnaire (B)) or advanced word processing / graphing	Intro to statistics and research methods (attendance dependent upon results of questionnaire (B)) or advanced word processing / graphing	Intro to statistics and research methods (attendance dependent upon results of questionnaire (B)) or advanced word processing / graphing	

9.8 Detailed Timetable cohorts 1 / 3

Time	Day 1		Day 2		Day 3	Day 4
9 15 - 10	Introductions		9.30 start	9.30 start	Database basics	Object / database relationships
10 -10.45	Data, Information, knowledge , wisdom and databases (demo)		(group 2) Library on line search demonstration	(group 3) Basic information management using computers	Megan - Excel?	Database practical 2 (Linking tables)
11.00 - 12.00	(group 1) Library on line search demonstration	(groups 2/3) Types of information systems	11.00 start (group 1 / 2) Basic information management using computers	11.00 start (group 3) Library on line search demonstration		
12 - 12.30	(end 12.30) Attendance for rest of day dependent upon results of questionnaire		(end 12.30) Attendance for rest of day dependent upon results of questionnaire		Classification systems	System development + introduction to front-end back-end concepts
Lunch						
1.00 2.00	IT terminology (1) The PC		IT terminology (2) Computers working together		Views, CRUD & Data dictionaries	Database pract 3 (Forms)
2.00 - 2.45	Megans IT session 1		Megans IT session 2		Database pract. 1 (Help + tables)	Social Issues 1
3.00 - 3.50	logging on + Word-processing		Word-processing			Megan - WWW
4.00 - 4.50	Additional practice on PCs		Additional practice on PCs		Objects	
5.00 - 6.00	Review Group 3 Types of information systems		Review		Intro to statistics and research methods (attendance dependent upon results of questionnaire)	Intro to statistics and research methods (attendance dependent upon results of questionnaire)

Pilot Course - Introduction to Health Informatics for Specialist Registrars

Time	Day 5	Day 6	Day 7	Day 8	Day 9 optional
9 15 - 10	Querying databases (demo)	evaluating systems + database revision	SPSS demo	Information systems as social systems (3) HCI and Clinical method (group exercise with video)	Using SPSS to analyse the CMDS
10 -10.45	9.30 start - Database practical 4 (queries)	Database practical 5 (summary queries)	9.30 start - SPSS practical small data sets		
11.00 - 12.00				HCI Evaluation methods	
12 - 12.30	Social issues 2 Information centres	Dynamic models and analysing clinical practices	Data available in the NHS	Database practical (7) exporting / importing data	
Lunch					
1.00 2.00	HISS workshop	decision support	Audit system workshop	Databases - review "so you want to develop your own?"	
2.00 - 2.45		Casemix and HRGs		Practical: Presentation software?? Megan	
3.00 - 3.50					
4.00 - 4.50	PC Practical - surgery	Database practical 6 (linked queries)		course review	
5.00 - 6.00	Intro to statistics and research methods (attendance dependent upon results of questionnaire (B))	Intro to statistics and research methods (attendance dependent upon results of questionnaire (B))	Intro to statistics and research methods (attendance dependent upon results of questionnaire (B))	Intro to statistics and research methods (attendance dependent upon results of questionnaire (B))	

9.9 Detailed Timetable cohorts 2 / 4

Time	Day 1		Day 2		Day 3	Day 4
9 15 - 10	Introductions		10am start		Database basics	Object / database relationships
10 -10.45	Data, Information, knowledge , wisdom and databases (demo)		IT terminology (2) Computers working together		Megan - Excel?	Database practical 2 (Linking tables)
11.00 - 12.00	10.30 start - Megans IT session 1 logging on + Word-processing (ends 12.30)		(11am) Megans IT session 2 Word-processing			
12 - 12.30	Additional practice on PCs		(ends 1pm)		Classification systems	System development + introduction to font-end back-end concepts
Lunch						
1.00 2.00	IT terminology (1) The PC		Additional practice on PCs		Views, CRUD & Data dictionaries	Database pract 3 (Forms)
2.00 - 2.45	(groups 2/3) Types of information system	(group 1) Library on line searching 3.20 end	(groups 1/2) Basic information management using computers	(group 3) Library on line searching 3.20 end	Database pract. 1 (Help + tables)	Social Issues 1
3.00 - 3.50	3.30 start (group 2) Library on line searching	3.30 start (group 1) Types of information system	(groups 1/2) Additional practice on PCs	(groups 3) Basic information management using computers		Megan - WWW
4.00 - 4.50			Additional practice on PCs		Objects	
5.00 - 6.00	Review		Review		Intro to statistics and research methods (attendance dependent upon results of questionnaire)	Intro to statistics and research methods (attendance dependent upon results of questionnaire)

9.10 Course material

A folder containing all the handouts and practical session material will be provided at the start of the module.

9.11 Suggested reading

9.11.1 Articles

The following articles will be provided as a handout at the start of the course.

Bailey J E 1990 Development of an Instrument for the management of computer user attitudes in hospitals. *Meth. Inform. Med* 29 51 - 56.

Baroudi J J, Olson M, Ives B 1986 An empirical study of the impact of user involvement on system usage and information satisfaction. *Communications of the ACM* [March] 29 (3) 232 - 238.

Berry D C, Hart A E 1990 Evaluating expert systems. *Expert systems* [November] 7 (4) 199 - 207.

Ives B, Olson M, Baroudi J J 1983 The measurement of user information satisfaction. *Communications of the ACM* [October] 26 (10) 785 - 793.

Willcocks L P, Mark A L 1989 IT Systems implementation: Research findings from the public sector. *J. I. T* 1989 92 - 103.

Wyatt J C. 1994 Clinical data systems part 1: data and medical records. *The Lancet* 344 [December 3rd] 1543 - 1547.

Wyatt J C. 1994 Clinical data systems part 2: Components and techniques. *The Lancet* 344 [December 10th] 1609 - 1614.

Wyatt J C. 1994 Clinical data systems part 3: Development and Evaluation. *The Lancet* 344 [December 17th] 1682 - 1688.

Young D, Chapman T, Poile C 1990 Physician, reveal thyself. *Brit. Journ. Healthcare computing*. Nov. 16 - 21.

9.11.2 Background reading

The medical school library stocks the following suitable books for optional background reading.

Tim Chard (2nd ed.) 1995 *Computing for Clinicians*. Edward Arnold. [This is an excellent book and really is much more concerned with medical Informatics rather than computing.]

Lee Nicholas, Millman Andrew. 1996 *ABC of Medical Computing*. BMJ publications London

Yates F E, (ed.) 1996 *Creative Computing in health and social care*. John Wiley & Sons. Chichester. [Excellent enthusiastic book written by someone living and working in Newcastle.]

William Bria, Richard Rydell 1992 *The physician-computer connection*. [A practical guide to physician involvement in hospital information systems. AHA Books.]

Enrico Coiera 1997 *Medical Informatics, the Internet & telemedicine*. Chapman & Hall medical.

Abbott W, Bryant J R, Sotheran M K. 1996 *Information management in health care - four handbooks*. Health information specialist groups of the BCS

F T de Dombal 1996 *Medical Informatics; The essentials*. Butterworth - Heinemann.

Hovenga E, Kidd M, Cesnik B. 1996 *Health Informatics: An overview*. Church Livingstone. [This is an excellent introductory book, however it is by and large a review of health Informatics in Australia.]

Medical Informatics (1991), Tim Benson. [UK based, Very good, very thin, and also very expensive £60. Slightly out of date now.]

9.11.3 Journals

It is recommended that the University (Medical school or Robinson libraries) stocks as a minimum the following journals:

Name	Frequency	Cost p a
JAMIA - Journal of the American Medical Informatics Association	Bi monthly	Individual: \$148.00 Institutional: \$265
MD Computing	Bi monthly	Standard: \$59
Methods of Information in Medicine	5 issues per year	Individual: DM 402 + 7% VAT Institutional: DM 280 + 7% VAT
The British Journal of Healthcare computing and Information Management	Monthly	Standard: £45.00
Information and software technology (Butterworth - Heinemann)	10 issues per year	£137
Behaviour and information technology	Bimonthly	Individual: £86.00 Institutional: £172

Additional journals that should be considered include:

Name
Medical decision making
The journal of clinical monitoring (Kluwer publishing)
Journal of intelligent Information systems
Medical progress through technology
Minds and Machines

The choice of Journal should also be based upon those that are ranked highly for 'impact factor' under the heading 'Medical Informatics' in the SCI journal citation reports.

9.12 Assessment

9.12.1 Student

For the vast majority of participants there will be no assignment. However those wishing to progress to the certificate will need to undertake one.

9.12.2 Course teaching

Students will assess the course from a number of perspectives using the evaluation questionnaire and feedback via the student representative(s) on the module board. See the relevant appendix for details of the evaluation questionnaire and the chapter entitled - quality of educational experience - for details of the module board.

10. Resource requirements for Newcastle

This chapter details the resource requirements for the CHIM module. Resource requirements for the introductory IT skills/knowledge module are not considered as this is dependent upon local factors such as the availability of in house basic IT skills training.

10.1 Human

10.1.1 Course leader

The course leader will be responsible for both the day to day running and ongoing development of the course.

Activity	days
Teaching (4 x 7)	28
Student tutorial support (2 hours per student, 300 hrs)	42
Preparation (including identification and nurturing of local champions)	20
Course administration	20
Pre course assessment	15
Post course assessment	15
Total	145

In addition to the above commitment the post-holder will also hold responsibility for developing the two modules for the proposed certificate in health Informatics.

Certificate in health Informatics (course of thirty)

Activity	days
Teaching (1 x 4 + 1)	4
Student tutorial support (7 hours per student)	26
Course administration	5
Preparation (first time development x 5)	20
Marking (five / day)	6
Module board activities	2
Total	63

Total commitment + 145 + 63 days = 208 days p.a.

This amounts to a full time post by assuming 50 days a year are allocated for background reading / research out of a total of 250 possible working days. It should be noted that this is if anything a under estimate of workload involved in the post.

It has been found from the pilot study that a dependency on the course leader develops due to the lack of any other suitable resource in the area.

10.1.2 Secretarial support

Secretarial support is required for distribution of various documents, preparation, including formatting of course material, population, development and maintenance of a participants database, booking rooms, arranging visits / meetings. They will also be expected to learn the basics of HTML to maintain a Web site for course notes.

Activity	WTE
CHIM	0.6
Certificate in Health Informatics	0.4
Total	1

The relatively high weighting for the certificate in health Informatics modules is due to the large amount of secretarial time required for organising student tutorials and the fact that this will be a new course.

10.1.3 Practical session facilitators

An adequate number of facilitators are required for support during the practical sessions.

Practical sessions	hours
Database practical (1)	1
Database practical (2)	2
Database practical (3)	1
Database practical (4)	2
Database practical (5)	2
Database practical (6)	2
Database practical (7)	1
SPSS	3
CMDS	3
Student selected topics	1
Total	18

Of Newcastle it is proposed to enrol 38 participants to each course. A ratio of facilitator to student of 1:10 has proved adequate in the pilot study. It is therefore necessary to employ three facilitators in addition to the course leader who will be running the sessions to maintain this level of support. This is lower than that used by many commercial companies (i.e. Mari provide 1 facilitator per 6 learners).

10.1.4 Workshop facilitators

Two three hour workshops concerning HISS and clinical audit will be run by visiting clinicians.

10.1.5 Visiting lecturers

Two sessions will be run by visiting lectures, one from the DH (health economist/ contracting expert) and the other from within the university (health economist).

10.1.6 Library

A one and a half hour library session will be facilitated by two senior librarians (split sessions). See sub-section below computing facilities - library.

10.2 Facilities

These have been discussed in the chapter 'Issues and recommendations'.

10.3 Consumables

It is proposed to supply each student with a set of course notes and background reading articles. The total number of pages will be approximately 200. They will be provided in a loose leaf folder.

A floppy disc containing the databases developed in the practicals will also be distributed to each student. These will also be provided on CD rom.

10.4 Costings

Costing categories that need to be considered when setting up CHIM are given below. It is suggested that each costing is considered at a number of levels. Firstly at the lowest, that of a single item; secondly at the individual student level; then for each course and finally the per annum cost to cater for the desired number of learners. In the case of Newcastle it would be 150 student p.a.

Any departmental / university overheads should be added where appropriate. Ongoing professional development costs for the course leader should be included along with any additional computing software / hardware and literature required.

Costs for a year	
Category / multiplier	
Library teaching	
Cookson Clinical computing	
	Needs assessment +Core IT skills + Knowledge (1)
	Core IT skills + Knowledge (2)
	Core IT skills + Knowledge (3)
	Excel
	WWW
	Powerpoint
CHIM visiting workshops	
	HISS (3 hrs@40.55)
	Audit (3 hrs@40.55)
	Human Computer interact. (3 hrs@40.55)
Computer practicals	
	Access / SPSS (18 hrs X 3)@15 per.hour
Speakers	
	HRGs +case mix (1 hr)
	Health economics (1 hr)
Course material	
	Floppy discs (2 each student)
	Course notes (approximately 200 pages including background reading)
	Material on CD
	Folders
Questionnaires	Assessment (B) And evaluation
Fell cluster use (aprox. 12 hours)	
Library	
	Books(approximately 30 x £30)
	Journals (approximately 6 x £150)
Course leaders salary (point20)	
Admins salary (point 16)	
Hardware (defined locally)	
Ongoing educational costs for staff	
Totals	
University Educational administrative overhead (??%)	
Grand Total	

11. Risk analysis for CHIM

This chapter presents some of the risks that were considered by those who developed the CHIM.

11.1 Recruitment

The probable uptake for the course is often difficult to determine. However this is not an issue if the course is considered to be mandatory, or at the very least actively supported by the Postgraduate Institute, for SpRs in the area where the course is to be run.

11.2 Poor prospect for Income generation

The evaluation questionnaire findings indicated that participants themselves were unlikely to pay anything but a small proportion of the costs of a course. It therefore appears unlikely that such courses could become self funding unless either the quality was lowered significantly or the course was opened up somehow. Two such possibilities are to make it available to a wider range of participants (i.e consultants) or geographically (i.e advertised nationally).

Financial support in the form of study leave is therefore necessary.

11.3 Method of delivery and quality

It is important not to sacrifice the quality of the course to achieve optimum throughput. There is anecdotal evidence that bad initial experiences with IT training sensitises the individual and discourages further encounters with IT.

To enhance quality of the course it is essential to constantly adapt it based partly upon learner feedback. This is the rationale behind separating the pilot course into a four stage process, varying the day of the week and running two courses in parallel. The course must be relevant to the specific individual's immediate clinical needs as well as providing knowledge / skills which will prove valuable latter on in the learners career.

11.4 Value for money

The following information provides a context for discussing value for money.

Commercial organisation rates¹³:

Option A

- | | |
|--|------------------------|
| 1. Average course cost per person per day | £120 |
| <i>Total for 7 days for 150 participants = £126,000.00</i> | |
| 2. Corporate rate (maximum 10 participants) per day | £500 (=£50 per person) |
| <i>Total for 7 days for 150 participants = £52,500.00</i> | |

Option B

Alternatively:

- | | | |
|---|---------|---|
| Hire a trainer | per day | £500 (£150 to £700 depending upon complexity) |
| Hire facilities for 10 | per day | £150 |
| <i>Total for 7 days for 150 participants = £78,750.00</i> | | |

Most professional training companies have a maximum student facilitator ratio of 1 : 6 or occasionally 1 : 10.

Such courses would not provide the medical relevancy which is core to the proposed course nor the quality of educational experience. Furthermore it is unlikely that such trainers would be available for ad hoc discussions after the course.

The proposed CHIM therefore offers excellent value for money.

11.5 Teaching infrastructure and the Sowerby unit

Up until this point in time the Sowerby unit has not been involved in large scale teaching, in contrast to the Cookson computer unit. Furthermore either units possess an educational infrastructure, in so far as module boards and the ongoing administration requirements for running university accredited courses. This is in contrast to many university departments,

¹³ These figures are based upon discussions with a leading training organisation - CTAC - and various IT training magazines

including the post graduate institute. The costings for the course are commensurate with the lack of an educational infra-structure.

To gain the necessary organisational experience links have actively been sought with other departments and it is proposed to include on the module board someone with the appropriate experience as part of the QA mechanism.

11.6 Integration

The integration of the course into the overall program of SR training is vital. This document provides a starting point for much work that needs to be undertaken locally.

11.7 Status of HI module

CHIM will form the basis of a certificate in Health Informatics based upon quantitative feedback from learners on the pilot. However it is improbable that those on the pilot appreciated the amount of work that will be required. It may be more appropriate to integrate the course into a more generic MSc.

12. Quality of educational experience of CHIM

The educational rationale underpinning the CHIM content and delivery is based upon three respected educational approaches:

- Adult learning (Knowles, 1980)
- Student centred learning (Knowles, 1980)
- Bloom's Taxonomy of educational objectives (Krathwohl, Bloom & Masia 1956)

12.1 Adult and student centred learning

The CHIM will provide a learning experience which is centred around the students needs. Additional, reference sources along with material will be provided as part of the course material to allow students to take any of the topic areas further. One whole afternoon will be devoted to topics that the students may wish to learn more about. The students will be seen as a integral component to course content, feedback and development. The learning experiences offered in CHIM have been structured in such a way as to foster mutual learning ('androgogic') rather than teaching ('pedagogic').

The course leader has time allocated for ad hoc queries from students who will be making use of the knowledge/skills learnt on the course in their own clinical areas to enhance the student centred aspects of the course.

Couching the educational experience within the framework of the learners professional development is achieved by ensuring that practising clinicians present much of the information. The learning experience is enhanced further by seeking out and using local clinicians where-ever possible in contrast to national experts or pure academics.

The learning contract will foster a adult approach to the learning experience, enhanced by those characteristics of the course described above.

12.2 Bloom's Taxonomy

Bloom devised a six level hierarchy of educational experience. The lowest level, 'knowledge' representing fact retrieval and the highest, 'evaluation', the process of making some value judgement based upon a range of information. Details along with medical examples are provided below:

Level	Explanation - from Miller, Sadler, Mohl & Melchiode 1991
Knowledge	The recall of specifics or related facts. This process emphasises the psychological processes of remembering. It includes knowledge dealing with specific facts, trends, classification and theories as well as procedures employed in a specific subject field. Knowing the major risks for a patient with a particular illness would be an example of this level.
Comprehension	This represents the lowest level of understanding. Comprehension involves making use of an idea without necessarily relating it to other material or realising its full implication. Examples are interpreting the meaning of a graph or predicting the continuing spread of a contagious disease.
Application	The use of abstractions or principles to solve problems. These may be in the form of generalisations or theories which must be remembered and applied. Examples include applying scientific terms discussed in a paper to other situations, or solving health problems using scientific knowledge.
Analysis	The breaking down of complex information into simpler parts to understand how they are related or organised. Analysis is intended to clarify and provide an understanding of the interactions between elements. An example would be relating a patient's previous symptoms to a current medical condition.
Synthesis	The process of combining concepts to constitute a new whole. This includes creating completely new products such as writing a composition or developing a differential diagnosis for a patient.
Evaluation	Making value judgements based on some given criteria or standard. Comparing two different medical procedures regarding patient prognosis is an example of this level.

Blooms taxonomy can be applied to the main topic areas in CHIM to obtain an indication of the level of cognitive experience proposed.

	Main topic areas in CHIM				
Blooms level:	Psycho-Social Issues	clinical Applications	System design / evaluation	Human computer interaction (HCI)	Skills
Knowledge	✓	✓	✓	✓	✓
Comprehension	✓	✓	✓	✓	✓
Application	✓	✓		✓	✓
Analysis	✓	✓		✓	
Synthesis	✓	✓			
Evaluation	✓	✓			

It is pertinent to note that while the timetable for the course appears very HI computer skills oriented the two non hands on topic areas, psycho - social issues and clinical applications, provide a higher level of educational experience by way of group discussions and structured workshops.

12.3 Module board

The module board will consist of the following members:

- | | |
|---|--|
| Robin Beaumont | course leader |
| Student representative(s) | To be announced |
| Cathy O'Halloran
Institute of Medicine & Dentistry, Newcastle. | Lecturer in medical education Postgraduate |
| Alan Rich | Associate post grad dean post. Grad. Inst. |
| External to department academic member | Under discussion |
| External to university academic member | To be announced |

12.3.1 Time table

The module board will meet twice before the course commences (with a student from the pilot representing the student perspective) and once after each course to serve as a formal review of the teaching experiences and the results from the evaluation questionnaires.

12.4 Comparison with Newcastle University quality unit criteria

A comparison between CHIM and the standards recommended in the Statement of good practice worksheets produced by Newcastle University quality unit criteria has been undertaken. Overall CHIM comes out very well.

12.5 References

Krathwohl D R. Bloom B S. & Masia B B 1956 Taxonomy of educational objectives: The classification of educational goals. Handbook II: Affective Domain. David McKay Company Inc. New York.

Miller D A Sadler J Z. Mohl P C. Melchiodi G A. 1991 The cognitive context of examinations in psychiatry using Bloom's taxonomy. Medical Education 25 480 - 484

Knowles M 1980 The modern practice of education from pedagogy to androgogy. Chicago Associated press / Follet publishing co.

Knowles M 1973 (2nd ed.) The adult learner: A neglected species. Gulf publishing company. London.

13. Issues and draft recommendations

This chapter discusses those issues felt to be important when planning a course similar to the pilot described earlier in this document. A set of draft local and national recommendations are also provided. An earlier draft set of recommendations were distributed, to obtain a set of comments many of which have been incorporated into those given below or, listed in the 'comments' boxes to be found throughout this chapter. Hopefully readers will find the comments a useful mechanism for gaining insight into the wide range of views held by those interested in HI.

13.1 Local level

13.1.1 Close contact with stakeholders

When setting up the Newcastle pilot the course leader forged close working relationships with a large number of stakeholders including:

- Postgraduate Institute of Medicine and Dentistry;
- Specialty clinical tutors;
- Known champions of HI within the specialties represented on the course in the local area;
- Those running similar courses;
- Regional IM&T Training and Development Advisor - Di Millen.

The last three groups were particularly important in providing free marketing for the course as well as offering valuable input into the actual course design.

Due to the planned introduction of HES data analysis in future courses two additional groups of stakeholders will also be involved in future, the Hospital IM&T departments and the HES section at the DoH.

If more advanced courses are planned it will be essential to form links with the statistics and computing faculties (primarily for database, AI and systems analysis expertise). If large numbers of students are involved the computing services will also need to be consulted (organising user IDs and access to various networks). Presently a rather convoluted administrative procedure exists.

A learner representative should be present on all groups, excepting those that discuss individual work. This falls in line with HEFCE recommendations. The importance of developing links with the library is discussed elsewhere.

1. Recommendation: It is essential to develop close links with all stakeholders who may have an interest in any prospective course.

Comments:

Strongly agree (x7) + Radical!.

The initiative is very welcome. Anything that improves the uses of information is welcome.

The HES data analysis stakeholders are inadequate and should include classification expertise and clinical terming expertise. I.e. Hes ≠ patient description.

Involvement of hospital IM&T departments complicated as degree of sophistication varies from hospital to hospital.

Yes but - the content must relate to participants not the stakeholders interests. (x2) + Input needs 'controlling' to carer needs and not 'done to death'.

Two other groups of stakeholders need including; hardware providers and accreditation bodies. + Royal colleges + CSG, AC16, local trust chief executives + senior managers.

Vitally important in the training of junior doctors are the Royal Colleges. They have a network of tutors throughout the country.

13.1.2 Attendance

During the planning stages of the Newcastle course it was found that one of the most important aspects of course success was going to be the selection of an appropriate format to ensure good attendance. It was found necessary to offer the course in 'work time' for whole day periods. The course must therefore be approved by the local Postgraduate institute or equivalent organisation. Learners must be freed from clinical commitments to attend these 'approved' courses and the clinical line manager committed to their attendance for the entire course.

2. Recommendation: Approved HI education should be considered as being suitable for study / research leave.

It may be appropriate to introduce personal and organisational incentives / penalties to encourage attendance.

To fulfil the above recommendation it is necessary to have some type of accreditation set up, probably locally by the relevant Postgraduate department. There is also a requirement for national guidelines, see the section on national recommendations for further details.

3. Recommendation: Local mechanisms of accreditation for any planned courses should be investigated.

13.1.3 Preliminary IT Skills / knowledge course

Findings from the Newcastle pilot, in agreement with those from similar courses in the past, indicate the need to allow individual learners the opportunity to attend a preliminary IT skills course¹

As an observation, at Newcastle the preliminary IT course is run by the Medical School Computing Centre, other universities are not so well catered for and make use of less specific campus wide facilities. Once exposed to these skills the learners must constantly use and develop them throughout any subsequent HI teaching.

4. Recommendation: Preliminary basic IT skills / knowledge courses should be offered to those who may require them before any HI education commences.

Comments:

Accreditation very important - NB. Consider 'CV' needs of attendees re. Future consultant appointments.

Problem of getting free time to attend, daytime courses. Generally, Competition with other professional courses and available study leave.

'IT' type training requests need to be addressed and specified up front - i.e. that informatics is not IT.

2 - 3 Strongly agree (x8). Needs to be sorted out at a higher level than those planning the courses.

Get it linked to the study periods mandatory under the Calman proposals. This will enable you to have a day a year say for all trainees. Time for this should come out of the 10 days / year all SpRs are allowed.

4 - Unsure unless you can stipulate how preliminary and basic the IT skills need to be. Do they need some preliminary information management skills?

4 - Agree (x5), + a must + particularly attractive to your average doctor.

It would need more justification to sustain the argument that teaching basic IT skills to medical students is very different (apart from their innate sense of superiority!) from teaching other undergraduates.

The need to teach basic IT skills may fall when the present government introduces IT and networks to all schools.

Assessment of entry skills would add considerable value. (x4)

13.1.4 HI Theory / Practical skills balance

Both the pilot and planned courses offer approximately a 50% split between HI computer skills development and theoryⁱⁱ. Both these elements run in parallel much like learning a musical instrument. Abstract concepts such as data modelling and database management systems require practical experience before they can be assimilated by learners.

5. Recommendation: Basic HI training should consist of approximately an equal split between HI computer skills development and theory.

13.1.5 Course material

The production, distribution and maintenance of course material for HI education is more problematic than in most other academic areas requiring consideration of redundancy and specificity which are discussed below.

13.1.5.1 Redundancy

HI is a rapidly developing and changing area. Techniques are rapidly developing, changing and being overtaken by others. For example to teach the basics of HTML requires the demonstration of different software and production of different handouts each year. It is interesting to note that Newcastle Computing Department, who publish several 'how to' guides have produced three substantially different handouts on this topic in the past year. This indicates that most course material needs substantial revision within a year. This is particularly important regarding software tutorials where most suppliers update at least annually.

It should therefore be assumed that most course material produced will become redundant after approximately one year. This does not mean that learners need to revise their knowledge at such frequent intervals only the materials produced by those who teach these skills.

6. Recommendation: Course material developed for basic HI training should be assumed to have a short (i.e. one year) life span.

13.1.5.2 Specificity

The course material for the Newcastle course was developed for a specific set of specialties, described elsewhere in this report. Examples, which are specialty specific, are given throughout the course material which in all probability partly accounted for the excellent rating of the material in the evaluation questionnaire. Producing more generic material would probably have resulted in a less favourable evaluation.

7. Recommendation: Course material developed for Basic HI training for SpRs should provide specialty specific clinically relevant examples.

Specific local requirements such as the particular version of software on a network, or a particular systems analysis methodology that is prevalent locally also influences the course material. It is therefore essential to involve local IM&T managers in the planning stages of the course. Such local variations should be presented in a analytical academic light rather than a mere implementation of policy. Academic implies some sort of critical analysis of the ideas presented rather than presenting 'cookbook' solutions.

8. Recommendation: Course material developed for Basic HI training for SpRs should contain local IM&T managers preferences wherever possible. These should be presented in an analytical light.

Comments:

5 - I am not convinced that a great deal of theory needs to be taught (x4). I painfully learnt low level language programming.

Databases and data modelling are not HI specific.

5, 6, 7 agree (x6).

Fundamental HI material does not need revising so often.

6 rather depressing but probably true

7 - This may be your personal prejudice? + HI skills / knowledge enhancement occurs when there is a direct applicability to a participant's needs. + vital - the whole course should revolve around clinical medical examples.

8:

Agree.

Perhaps you could clarify what is met by 'academic light' (x4).

Also IM&T manages policy in different institutions may provide valuable breadth of knowledge for SpRs.

Not sure about this What do IM&T managers know? They will hopefully be very knowledgeable on the technical aspects but may have little knowledge of the impact of clinical systems they are supporting. The few hospitals that have 'clinical' systems should be used.

13.1.4 Agree. Question of multi-professional courses (e.g. Drs and nurses) needs to be considered.

Presenting IM&T managers preferences may lead to problems (x2).

SpRs move around regions. I'm not sure about trying them to specific local perspectives. I think they need generic skills and use current 'brand' leaders rather than Mr X's preference.

Students find it difficult to see beyond the IT aspect. Expressed needs always seems to targeted towards acquiring a particular IT (software) skill.

May need to consider top-up or follow-up courses if material quickly goes out of date.

13.1.5.3 Use of appropriate methods to minimise adverse affects of above factors

Given the above it is essential to develop course material using the most economic method, which also optimises dissemination and minimises the costs of redundancy. Lecture notes are often considered to be antediluvian but they allow rapid change, do not require any great technical expertise and can be produced directly by teachers. Furthermore traditional lecture notes can be readily transformed to local web pages (as part of an Intranet facility i.e. WEB technology) or appropriately timed e-mails (+ attachments) for learners with little or no effort. In contrast CAL requires a whole software development cycle including management as well as maintenance, supportive software, and documentation as well as highly trained personnel.

A large number of CAL evaluation studies have been carried out. Considering one area specifically, that of nurse education, various studies have demonstrated that the principle advantage of CAL is largely that of flexibility. However, few if any of the so called evaluation studies have included comparison groups and even fewer have randomly allocated subjects to the various groupsⁱⁱⁱ. Quoting a recent article (1995) considering the teaching of computer skills to older people^{iv}:

"..The research to date comparing computerised tutorials with other teaching methods has consistently shown that they are less effective than other methods (Czaja et al 1986, 1989, Harrington et al 1990, Gist et al 1988, 1989). . . .No study could be found in which computerised tutorials yielded superior performance to another training method. (p115)"

The above evaluations fail to take into account the all important economic aspect which is discussed in the following section.

9. Recommendation: Course material should be produced using the most economic method, which optimises dissemination and minimises the costs of maintenance, management and redundancy.

Comments:

May be a good plan to give examples of economic CAL production. What tools should / could we use.

I'm not sure of the relevance of para.2 here. Where these evaluations of the economics of CAL production / implementation?

Agree (x7) and very important.

The more complex computer based CAL packages are, the less likely they are to be kept up to date. This is why I think these will eventually be taken over by commercial sponsors rather than constructed in house.

13.1.6 Student support

From the evaluation questionnaire it would appear that the particular group of students on the pilot at Newcastle greatly valued face to face contact and find it an essential part of an HI course, particularly when it came to discussing HI social issues and sharing experiences. Often students come to a course to solve a specific problem which requires individual tutorial support.

In agreement with other findings, students want more small group face to face contact^y. However, dependent upon the source and amount of funding it may not be possible to provide this.

Appendix 2 to the Dearing report (National Committee of Inquiry into Higher Education 1997) provides an options analysis of various teaching strategies which will contain costs but allow an increase in student numbers. They recommend the change from present teaching techniques to one firmly based on external RBL (Resource Based Learning such as textbooks, commercial CDs and software). The committee make this very clear:

"It is clear from the above that continued expansion will require a radical shift in the way university teaching is carried out. The implications of the 'Future' are far-reaching. To achieve [the desired] cost curve, while preserving staff-student contact, it was necessary to increase RBL to cover the majority of student learning time. For that to be acceptable, the resource materials must be very well-designed, (whether print, audio visual, or software), and capable of supporting a student working independently. Traditional text-book style will not suffice".

Unfortunately any amount of economic forecasting can not predict the quality of the new experience from either the learners or teachers perspective. In the above exercise quality was considered to be equivalent to the amount of student staff contact time. The importance of quality alongside throughput in this situation suggests that a cost utility analysis should be performed rather than a simple costing exercise using some type of experimental design. Another aspect that forecasting fails to take into account in this situation is the importance attached to local ownership of most material presently produced. Lack of local ownership in this situation could mean that such central resources might rapidly become shelfware.

Results from the Newcastle pilot, where students had experience of both CAL and traditional teaching techniques indicated that they would have perceived the above regime as a far less valuable learning experience.

The above discussion of alternative delivery methods might seem somewhat irrelevant, however there are approximately 900 SpRs in the Northern deanery with an average training period of five years indicating a training requirement of 108 p.a. Not an insignificant number.

unnumbered recommendation: Careful consideration should be given to Method(s) of course delivery.

Comments:

Given the trends in undergraduate education re. HI we can segment the challenge into 2 parts; a, the initial 'vacuum' in HI for postgraduates say an 8 year problem. b, post basic HI for 'tomorrow's' doctors.

Small group teaching with an enthusiastic teacher always wins hands down over all other methods. But, Dearing is probably right We shall have to experiment with RBL and CAL and try to optimise it - if necessary supplementing with face to face instruction. The computer with a built in camera and an ATM help line to a (possible remote) teacher may well be the way.

Agree (x3)

Local ownership is important so too is a national resource - again the need to share materials across centres.

Developing resource materials needs funding - it is a highly labour intensive activity, which needs to be ongoing and continually evaluated.

Agree that computer based RBL needs enhancing to take on as much 'core' material as is possible and leave the 'human - time' for bits that can't be done by computer.

The course attendees are the medical teachers of the future - they are going to have to become familiar with the newer teaching methods. The Newcastle course is probably the first exposure they will have had to such educational methods.

Given the future perspectives on medicine (see Weed's recent BMJ article), distance learning (CAL via the WEB) will become the norm for ensuring ongoing education of clinicians. It seems important to explore this medium.

Distance learning backed up by assignments and regular tutorials rather than a block of time away from clinical duties is best.

Conventional teaching is TOO expensive. CAL is essential.

There is no need to take a kick at CAL other references which present a more favourable view are:

Kulik cc, Kulik J.a. (1991) Effectiveness of computer-based instruction: an updated analysis. Computers in Human behaviour 7: 75 - 94 [a meta-analysis of 254 studies]

Jelovsek FR, Adobonjo L (1993) Learning principles as applied to computer-assisted instruction. Computer Assisted Instruction 10: 165 - 172

Gathy P, Deneff J-F, Haumont S. (1991) Computer Assisted Self-Assessment (CASA) in Histology. Computers in Education 17: 109 - 116

Luffingham JK. (1984) An assessment of Computer-assisted learning in Orthodontics. Br J Orthod 11: 205 - 208

Paskas JC, Fung K, Anderson JD (1991?) Comparison of self instructional methods of teaching diagnostic testing. J Dent Ed. 56: 316 - 320.

All students I have been involved in prefer CAL to everything apart from small group tutorials [dentist].

13.1.7 Infrastructure

13.1.7.1 Scarcity of skills

HI teachers are rare and few universities within the UK possess appropriate HI expertise. It is often difficult to obtain suitably qualified persons. Therefore any establishment seeking to develop HI courses should also consider the development of appropriate in house staff which may involve offering support in terms of creditable educational opportunities such as IM&T, basic computer science or clinical experience. Logistically it appears easier to provide the IM&T /HI component (in the form of one of the many part time degrees available) to clinicians rather than the clinical experience to IM&T personnel, although this is not impossible. This is discussed further in the 'national recommendations' section.

13.1.7.2 Funding

Few of those who teach HI are employed as teachers (i.e. tenured lecturers) in contrast, most are soft funded researchers. For example, in Newcastle both the pilot, and the four scheduled courses are isolated projects.

Any institution that is planning to develop such courses needs to consider alternative methods of course funding. It would appear that three possible alternatives exist, each associated with a greater risk:

- *Ad hoc* external training consultancy (individual or group level)
- Facilities management by an external agency or internal department

- In house delivery

Issues presented in this chapter indicates that the choice of which method a particular institution chooses should not only be based upon numbers of students and infrastructure considerations but also on national recommendations regarding SpR training.

10. Recommendation: When considering funding of basic HI education for SpRs the following three alternative approaches should be examined:

Ad hoc external training consultancy (individual or group level)

Facilities management by an external agency or internal department

In house delivery

The choice of which particular approach an institution chooses should not only be based upon numbers of students and infrastructure considerations but national recommendations regarding SpR training.

13.1.7.3 Integration with university core activity

Both the pilot and scheduled courses have been developed as non-core activities. There would appear to be a lack of recognition, acceptance and commitment to HI teaching. For example at Newcastle all HI teaching so far undertaken, including the proposed certificate, will be considered to be outside of the HEFCE exercise.

11. Recommendation: The exact status of HI teaching should be specified in the relevant faculty /departmental business plans.

Comments:

13.1.7.3: Should be outside the HEFCE exercise as it is a postgraduate activity.

10 - Agree (x4)

Commissioning expertise should be OK. Primary care has the greatest potential and some knowledge in all areas.

11 - Agree (x6), + is very important. + best approached by the Royal Colleges.

Often more than one business plan - GP centres, Trusts, Regions, PG deans etc. etc.

Development of a Certificate / diploma / masters e.g. in Primary care for GPs etc. may lead to HEFCE funding.

Medical students (who are very hard pressed) only take anything seriously if it is integrated with their core curriculum, same for SpRs?

In House delivery is certainly the most satisfactory for those involved in planning the course and could be cheaper.

'Unless HI and IT skills are integrated parts of academic courses, taught by properly qualified people, the subject will not be taken seriously and will be a fringe activity for anoraks.

Face-to-face contact may be difficult for busy professionals. Distance learning materials offer opportunities for participants to study at times and in ways appropriate to their circumstances.

HEFCE should be made aware of HI as an emergent discipline.

13.1.7.4 Internal markets and redundancies

The University of Newcastle, like most, suffers from reduced budgets where many departments experience reductions in staff. Furthermore departments often have overlapping responsibilities and aims. These factors produce a climate of fear, making departments wary of getting involved in non core activities which may subsequently affect their own future. These tensions produce barriers to collaboration. At Newcastle the pilot developed links with the Clinical computing unit which has the responsibility of introducing undergraduate students in the medical / dental and school of health sciences to IT.

12. Recommendation: When considering basic HI education for SpRs the possibility of organisational restructuring should be considered with the specific aim to produce the most cost effective and acceptable solution.

13.1.7.5 Departmental collaboration

In the past it has been voiced that the majority of HI education could be carried out by staff already in post who do not describe themselves as medical informaticians^{vi} and it is true that a large number of courses draw on other departments to a significant degree. For example the undergraduate degree in HI at Manchester has input from the computing and statistics departments as well as from the business school.

The table below lists areas in the present course that could in all probability be run by existing departments given the proviso that individuals with the necessary clinical interests exist within them. It should be noted that this situation is only likely to exist in those universities that possess a medical school:

Subject Area	Department
Basic IT skills	medical computing or university wide training
Databases	Computing or business studies
Organisational issues	Business school
HCI	Computing / Psychology
Medical systems	Computing / medical Physics
Systems development	Computing
Applied statistics	Business studies / statistics

The possibility of using resources in other departments should also be investigated

13. Recommendation: Appropriate individuals / resources in other departments should be sought out and utilised where ever possible.

Comments:

13.1.7.4 Text seems at odds with the recommendation.

Absolutely!

12 - OK (x3) + but a bit insular and irrelevant

13 agree (x6) strongly + there must also be a central core of HI knowledge (+ research).

What is fascinating is that HI as you describe it needs no clinical skills. That is why it keeps failing. It is like cost effectiveness studies with no health economic input, possible but highly undesirable.

What is more important is the quality of the teaching rather than the experience of the lecturer. I would like to see the business organisation emphasised. There is a lot of evidence that the full potential of IM&T in all situations is not fully realised because the organisation is not radical enough in its development to take full advantage if the IM&T.

See the HI 1997 yearbook about the situation at Manchester.

I think you are in danger of spending too much time on what might be regarded as special pleading. There is nothing wrong with a predominantly teaching function and HI could be a resource centre under the Vice-Dean for Education. A am not sympathetic to starting new departments. Most Medical Schools have far too many already.

HI is more than the sum of the parts presented in the above table.

A feel it will be a long time before enough doctors with adequate HI skills are ready to 'go it alone' - assuming that was desirable which it probably isn't.

At university X cross faculty courses are not as favoured as single department ones. Cost models as well as organisational barriers need to be flexible.

Students need to be given 'reassurance' about what HI is particularly if individual staff do not know what HI is.

How about collaboration with industry as well?

13.1.7.6 Virtual departments

Given the above factors, the case has been made for developing a virtual HI department, whose role is primarily co-ordination to produce formalised structured courses^{vii}. This does not take into account the relationship which most academic departments have towards teaching and research. The latter informing the former. It should also be noted that HI research is an expanding area.

Given the above proviso that there is a need in certain organisations for HI activities, there is a problem as to where to place them within the overall structure. For example at Newcastle the present course leader is based in the Sowerby Centre for Health Informatics which is itself presently part of the Primary Health Care Department which is part of the Medical School. The most obvious anomaly is that the SpR training is for Hospital doctors rather than primary care personal. A course devised for Primary Health Care personnel would be very different.

14. Recommendation: The organisational position of any Health Informatics activities should be carefully planned and frequently reviewed at a high level in the organisation.

13.1.7.7 Computing facilities

The Newcastle courses currently use, and will in future continue to utilise the medical undergraduate computing facilities. Dependent upon the long term aim of HI education for SpRs at Newcastle it may become necessary to increase the availability of computing facilities by way of providing 24 hour access (as is now the case at many universities), and in addition develop dedicated and / or on site facilities. At Newcastle an innovative project involving the linking of various Postgraduate centres is underway.

At Newcastle most of the software required for teaching the pilot course was already available. Additional software included the Read Codes and Electronic BNF. In future the HES dummy data set will also be required. Each new piece of software introduced incurs additional support overheads.

15. Recommendation: Any additional IT (software and hardware) requirements must be carefully considered for any proposed course including support overheads.

It has been found at Newcastle that practical HI IT workshops required a high level of human resourcing. The practical teaching rooms supported the use of display panels / projectors for demonstration purposes which proved to be invaluable.

16. Recommendation: Appropriate numbers of suitably knowledgeable educators must be available for practical sessions in suitably equipped rooms.

It may also be desirable to ensure learners have the ability to set up, along with access to, electronic mail lists and discussion groups. This will be investigated in future courses.

13.1.7.8 Library facilities

A library of suitably stocked books and journals is required (for details see chapter concerned with CHIM). This can be particularly problematic if funds for such acquisitions are on a *ad hoc* basis.

17. Recommendation: Discussions with the library should commence early in the planning stage.

Comments:

14 - 17 Agree (x4) + absolutely (x2)

14 - Why would a course for primary care be very different?

15, 16 - OK but again infrastructure.

We have problems with access to the university from hospital sites.

External sources could be accessed through the use of systems e.g. 'firstclass' Which offers a conference facility for students and tutors to access, raise questions and obtain a variety of answers - extremely useful resources.

13.2 National Level

The previous section described those factors felt to be important locally when developing a course similar to the pilot at Newcastle. The following section presents national issues.

13.2.1 Core or optional component to training

Presently the HI course at Newcastle is an optional component to SpR training. The exact status it has to SpR training is unclear.

18. Recommendation: The status and broad aims of HI training for SpRs needs to be clarified by the appropriate national bodies. These outcomes should be disseminated widely.

13.2.2 Content /delivery

As long ago as 1989 the NHSTD produced a set of recommendations for HI course contents^{viii}. More recently the IMG have produced several courses for managers along with sets of learning objectives which appear more restrictive than those in the original 1989 recommendations. Other initiatives have involved nurses amongst other groups. Dr Ian Purves at the Sowerby Centre has also produced a set of recommendations for the content of HI courses. It is also known that Di Millan (Northern and Yorkshire NHS ME training advisor) is currently working on defining course contents as part of a national initiative.

To achieve maximum utilisation of any syllabus developed, besides credibility, it is essential that it is applicable to as many groups as possible. At present it appears that recommendations for course content are fragmented, largely managerial rather than clinical in perspective (the exception being Dr Purves' document) and often lack educational credibility (no learning objectives, no methods, assessment or outcomes defined and the lack of a clearly modularised approach).

19. Recommendation: A national forum should be set up to develop a set of robust and educationally credible syllabi. The syllabi should attempt to map to other groups who have HI training needs (managers, nurses, technicians etc.) by forging links with the necessary groups. Educational curriculum development expertise should be obtained to manage this process.

The Newcastle certificate in HI is due to commence in summer 1998 will build on the present course, adding two further modules. Further modularised development into a diploma will take place if it is considered appropriate.

20. Recommendation: Any Planned course should be developed in a modularised manner to facilitate credit accumulation and transfer.

Comments:

18 difficult at present; Possibly through the Postgraduate Deans or Academic Colleges with ACIG as watchdog / champion.

18 agree and this is happening mainly by the Medical Royal Colleges + should happen via the Colleges. + What is 'appropriate bodies' DO you mean the SAC of the Joint Committee for specialist training perhaps, or the JCST itself.

18 + 19 excellent! (x4)

20 agree (x5)

19 agree but difficult (x3) - The problem about a national syllabus in a fast changing field is that it may take so much time to agree it that it will already be out of date when you do - and then there will be the problem of revision. A loose network sharing ideas seems better at the present stage rather than a standard curriculum. Universities have access to excellent EMAIL and bulletin board facilities via Super Janet [*and free use of Mailbase at Newcastle University*].

To big and outside remit perhaps?

The input of advisors on adult learning methodologies is essential for the development of the curricula.

I am for an independent discipline of HI I am against the idea of 'pcore informatics', 'hospital informatics', 'nurse informatics', 'Medical informatics'. Care must be taken to make HI a holistic & unified subject - not one that is fragmented, playing catch-up with technology.

Need to remember undergraduate links.

The content / delivery of HI courses needs input from a wide range of sources, including academic books and HI societies e.g. BMIS, BCS, PHSIG etc.

I agree entirely, it is so encouraging to read this paper produced by a university with medical input for medics.

13.2.3 Accreditation

There are several reasons why accreditation needs to be considered. It will provide a springboard for possible career development, specify where the course sits within SpR training and enhance the credibility for those involved in teaching and undertaking such courses. It is essential that acceptable levels of learning outcomes should be comparable with other similar courses developed at reputable establishments. They should also be in alignment with the syllabi mentioned in the previous recommendation. The accreditation process should evaluate student assessment criteria and should include assessment of the competency of those delivering the course. This may well include the Dearing report recommendation that those teaching should hold a recognised teaching qualification.

21. Recommendation: Valid objective methods of student and teaching staff assessment must be integrated into courses seeking accreditation.

22. Recommendation: National accreditation guidelines need developing for local implementation.

23. Recommendation: Credit accumulation and transfer schemes should be investigated to allow progression over a number of years in different geographical areas.

13.2.4 Lack of integration with other strands of HI teaching.

Time constraints demanded that the pilot course at Newcastle be developed largely in isolation. It may be more economical to attempt to integrate aspects of existing HI courses into new courses.

24. Recommendation: Any Planned course should develop links with, and integrate wherever possible into appropriate existing HI courses.

13.2.5 Support for course leaders

No specific national forum appears to exist for disseminating material or encouraging debate other than *ad hoc* activities. These are frequently, inappropriately classified as 'research'. Baseline data is available through the 'Champions database' to set up a HI teachers group. It may be possible to use an existing forum as a basis for this.

25. Recommendation: Managerial and resource support should be made available to develop a national forum for teachers of HI including regular newsletters and more importantly face to face meetings.

Comments:

Compare with other elements of generic skills / knowledge, e.g. ethics, communication skills, investigate lessons to be learned, successes / failures.

SpR training in HI should be a primer (?up to PG Certificate level) and thus should be generic and relevant to all specialties and sectors.

The movement of SpRs means that the transferability of the award for modules is very important.

21 -> 25 All strongly agreed with (x6).+ but a huge task

Accreditation is essential to secure 'buy in' from SpRs. Probably should come down from the colleges.

One of the areas posing significant risk to the trust.. is staff, who have a complete lack of awareness in relation to the rules and regulations of Computer use, including the Data Protection Act, Computer Misuse Act, Confidentiality, Code of Connection and Display Screen Equipment regulations etc. Many have PC's at home ... and now consider themselves experts, as a result viruses have been introduced, Doctors experimenting have shut down PAS systems.

25 - pigs might fly!

Don't forget the Technology Foresight Initiative.

13.2.6 Support for HI students and others interested in HI

During the last two years a newsgroup (GP-UK) has been running to encourage discussion and debate among GPs. The author of this report has recently set up a similar newsgroup for Hospital doctors interested in HI (Hospdoc). However, because of financial constraints the resource will not be advertised widely and it is unlikely to be adequately supported. For similar reasons the planned quantitative evaluation is unlikely to be sufficiently rigorous in either breath or depth. Such an evaluation is required as such resources have not been effectively evaluated in the past.

26. Recommendation: A project involving the thorough quantitative evaluation of a pilot national newsgroup for Hospital Doctors interested in HI should be implemented. The newsgroup should be given a high profile and marketed nationally. Initially it may be necessary to offer incentives to users. Methodologically it would be an advantage to develop some type of RCT involving alternative interventions and if at all possible randomisation.

13.2.7 Career development for those interested in HI

The local issues concerning career development for those wishing to teach HI has been discussed in section 13.1.7.1. This section considers national issues.

Several accredited courses (postgraduate certificate, diploma and MSc level) presently exist for those interested in HI, including distance learning packages including the well established Open University courses. Unfortunately the majority of these courses lack integration with the clinical environment, an essential aspect of HI, and less frequently are structured inappropriately, making attendance almost impossible, for most clinicians other than established consultants or GPs.

Considering HI teachers in contrast to those with an interest in developing HI education; these are rare and there are few universities nationwide which possess appropriate HI expertise. Studying the 'Champions database' would suggest that those who deliver HI courses are one of four types of person, clinicians who have an informal interest in HI ('hobbyists'), IT trainers, IM&T educators, and finally those who possess both a clinical qualification and a formal qualification in IM&T or HI.

Given the centrality of knowledge of both the clinical environment and IM&T / HI for effective HI education would suggest that several of these types of HI teacher require additional educational experiences to gain an optimal knowledge base.

27. Recommendation: Those who actually teach HI should make every effort to develop an understanding of both the clinical environment and IM&T / HI which includes obtaining the appropriate qualifications. Medical schools should be involved in course development, particularly if it is anticipated that clinicians will undertake the course.

Comments:

26, 27 agree (x5)

We need it now!

To have credibility, educators should have the appropriate academic qualifications, often expensive managerial consultants have no such qualifications. I agree entirely about many of the 'Champions database' entries being hobbyists, and suggest it is in their interest in being in the database to sell their services.

The problem of assessing the qualifications of those who teach HI is compounded by the lack of any accepted standards or definition of HI qualifications. In the UK, BMIS (The British Medical Informatics Society) has introduced a Fellowship of MI which is awarded to suitably qualified applicants.

HI + IM&T should be incorporated into undergraduate / postgraduate medical training to prepare doctors for the future.

A very worthwhile initiative.

13.3 Comments

Thanks must go to those who provided comments to the draft questionnaire including:

A J Sithers (CTI Medicine, University of Bristol)

Chris Stephans (Department of Child Dental Health, Bristol Dental Hospital)
Colin Dollery (London University)
David Young (University of Birmingham, City Hospitals NHS Trust)
Di Millen (Bradford Community Trust)
Heather Heathfield (University of Cambridge)
Helen Quinn (University of Sunderland)
Ian Purves (SCHIN, Newcastle University)
J G Williams (University of Swansea)
J McClelland (Queens, Belfast)
Jeanette Murphy (CHIME, UCL Medical School, Whittington Hospital Campus, London)
John Anderson (Postgraduate Institute of Medicine & Dentistry, Newcastle University)
Kieran McGlade (Queens, Belfast)
Martin Severs (University of Portsmouth)
Moirra Simpson (Gateshead Hospitals NHS Trust)
Nick Fox (University of Sheffield)
Paddy Harrigan (Postgraduate Institute of Medicine & Dentistry, Newcastle University)
Pat Lane (Department of Primary Health care, University of Nottingham)
Peter Sonksen (St Thomas's Hospital, London)
Philip Holton (NHS ME, Durham)
Steve Kay (Informatics group, Manchester University)
Susan Night (IMG Leeds)
Tina Donnelly (University of Sunderland)

13.4 Notes

ⁱ Dollery & Williams 1996 Informatics in undergraduate medical and dental curricula. The need for a preliminary IT skills course in born out in the chapter by Ray Jones; "Of the 1995 intake 31% of students could be termed computer literate. . . . Medical students are also fairly typical of other students" (p29). Comparative figures are given in the text.

ⁱⁱ The rationale for this can be found in the final report, along with results from Ray & Minch (1990) Computer anxiety and alienation: towards a definition and parsimonious measure. *Human factors* 32 (4) 477 - 491

ⁱⁱⁱ An early review of the various CAL evaluation studies in nurse education can be found in Benton D 1989 An evaluation study of CAL. *Information technology in nursing* 1 (3) 37 - 42

^{iv} Kelley C L. Charness N. 1995 Issues in training older adults to use computers. *Behaviour & information technology*. 14 (2) 107 - 120

^v Dollery & Williams 1996 Informatics in undergraduate medical and dental curricula. In discussion (p59) Dr Longstaff from the Bristol CAL project makes the following telling statement "If you ask the students what they want, they say more small group tutorials. The fact is that we cannot provide that, and well designed computer-based learning is the next best thing." The same sentiment is stated by Sir Colin Dollery in the summary to the document "Although some students would much prefer to be taught in small tutorial groups, with staff : student ratios getting worse that is a luxury which perhaps even Oxford and Cambridge will find it harder to afford, and most of the rest of use will not be able to do" (p63).

^{vi} Dollery & Williams 1996 Informatics in undergraduate medical and dental curricula. In discussion (p59) Dr Short.

^{vii} Dollery & Williams 1996 Informatics in undergraduate medical and dental curricula. In discussion (p24) Dr Sonksen.

^{viii} The actual document did not mention the term Health Informatics but used the term 'information management' throughout. However looking at the content it is clearly suggesting those topics which would be included in a HI course.

14. Appendices

14.1 Examples of detailed learning outcomes for the new course at Newcastle (CHIM)

The following are a selection of the detailed learning outcomes for several of the sessions in the present course. Learning outcomes for other sessions can be found in the course material. Available from Robin Beaumont.

1. For the first session discussing data:

- Know what a data item is along with its characteristics
- Be able to classify data items into fixed and changeable types
- Be able to classify data items into persistent and dynamic types
- Be able to classify data items into the common data types stored in Access
- Know what a coding system is
- Know how to produce a coding system
- Know the importance of specifying the unit of measure
- Know what a data dictionary is
- Be able to construct a data dictionary from a set of data items

2. For the session discussing Information and Knowledge:

- Know what the information pyramid is
- Be able to classify data/ information in one of the three levels of the information pyramid
- Know the dependency between the levels in the information pyramid
- Have an awareness of the possible benefits and problems of data entry at 'point of service'
- Be aware of the range of contrasting definitions of 'information'
- Be aware of some of the additional characteristics of information that are not found in data as described by Devlin using the Infon concept
- Be aware of the centrality of the human brain in converting data into information
- Be aware of the large amount of pseudo-science around concerning this subject

3. For the first SPSS session:

- Be able to open and close SPSS for windows
- Be able to describe the different windows that are used in SPSS
- Be able to enter and save data into SPSS
- Be able to obtain boxplots and histograms for grouped data
- Be able to obtain descriptive statistics for grouped data
- Be aware of the stem & leaf diagram
- Be able to obtain the mode
- Be able to copy charts into Word
- Be aware that you can copy results to Word
- Understand and be able to create grouping variables

4. For the first session discussing systems modelling:

- Know the purpose of a model
- Know the role 'systems analysts' play in modelling
- Understand the concept of the object as used in object oriented (OO) modelling
- Be able to describe the three parts of a class/object
- Understand the difference between a object and class
- Be able to identify and draw classes / objects using the Rumbaugh notation
- Know the different types of associations between classes
- Be able to identify and draw the different types of associations between classes
- Know what a 'view' is
- Be aware of the concept of inheritance and polymorphism
- Be able to develop a class/object model for a area you are familiar with

5. For the session(s) discussing the Information Centre (IC) concept:

- Describe what is meant by the modern data processing dilemma
- Describe the technological changes that have contributed to the modern data processing dilemma
- Discuss the relationship between Information systems and competitive advantage
- List the three main approaches taken to the modern data processing dilemma
- Describe the main aims of an Information Centre
- Describe the difference between a Information Centre and a traditional Data processing department
- List the main functions of a Information Centre
- Describe the 'consultancy' function of Information Centres
- Describe the 6 factors thought to be important by Devargas when assessing someone's suitability for involvement in system development
- Have an awareness of the activities that the Information Centre should undertake regarding access to corporate information for end users
- Discuss the concept of user forums
- Discuss the appropriate size of those projects deemed suitable for personal end user development.
- Discuss the relationship between a Information Centre and the main IM&T department
- Be aware of the concepts of facilities management and outsourcing
- Be able to draw organisational charts showing suitable and unsuitable positions of the Information Centre in the overall organisational structure
- Have an awareness of the various lines of responsibility encountered for Information Centres.
- Discuss the division of IT and Information management functions
- Have an awareness of the main functions for each role in the Information Centre
- List the characteristics of good training
- Have an awareness of the factors that need to be considered when considering staffing requirements for Information Centres
- Have an awareness of the staffing requirements for an Information Centre

6. For the fourth Access session:

- Describe what an Access query is
- Describe the components of an Access query
- Be able to create a query using the query design window
- Be able to add tables to the query design window
- Be able to run a query
- Be able to save a query definition
- Know how to save the results of a query to a table
- Be able to specify criteria for number fields for one specific value and a range of values
- Be able to specify criteria for text fields
- Be able to explain and use wild cards
- Be able to use the 'And' operator
- Be able to use the 'OR' operator
- Know the difference between 'OR' and 'XOR'
- Be able to find or exclude blank (NULL) fields

14.2 Mailing list

The following is the mailing list used to circulate the progress report:

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14.3 Original needs assessment questionnaire

14.4 Pilot course evaluation questionnaire

14.5 CHIM course self assessment questionnaires

14.6 Anaesthetics computer availability questionnaires

End of report

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