# A pilot internet teaching project to support specialist medical training

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***Regional training programmes involving specialist medical trainees at geographically separate sites lend themselves to distance learning methods. This paper describes the setting up and early evaluation of an internet-based project designed to support regional study days across North East Thames for respiratory medicine.***

## INTRODUCTION

Publication of the Calman report on postgraduate medical training in the UK (Department of Health, 1993) has resulted in a radical change to the delivery of trainee specialist medical education over the second half of the decade. Recommendations included the replacement of lengthy apprenticeships of 9–13 years with a formal training programme lasting 5–6 years in the specialist registrar (SpR) grade. The responsibility for organizing these training programmes is devolved to regional level for each speciality.

Within the North Thames Region the speciality of respiratory medicine has been split into two sectors, East and West, because of the large number of trainees and wide geographical area involved. The new North East Thames teaching programme involves 38 registrars training at 19 hospital sites, including two in other Thames regions, all travelling to a single venue for formal teaching sessions once each month.

Established for 12 months, the teaching programme is popular among registrars for its content and opportunities for social interaction. However, limitations are evident. Little continuity between sessions and a single meeting each month makes it difficult to combine the delivery of core curriculum material with analytical discourse through discussion or exercises. Summarizing previous meetings and preparation for future ones is lacking, and no allowance is made for those unable to attend particular sessions for legitimate reasons. These factors have led us to consider potential training enhancements using a distance-learning approach, providing a geographical and temporal 'bridge' between successive training day meetings. Successful experience of computers in this way might also encourage an increase generally in information technology (IT) usage for medical purposes.

The pilot project described here was established to assess the feasibility and pragmatic aspects of setting up an Internet site dedicated to supporting the monthly study sessions and identify those factors which assist or impede successful participation in such a programme.

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## METHODS

The project evaluation ran from June to October 1997. An Internet website was constructed using a freeware server package, Quid Pro Quo (v1.0), running on an Apple Macintosh Quadra 800 and later a Quadra 900. The Quadra server connected to the Internet via the Joint Academic Network (JANET-UK Universities Internet link) from Ultralab, Anglia Polytechnic University.

The server allowed only those involved with the training to have access to the site, requiring entry of a password and user ID to proceed beyond an introductory web page. Once logged-in, participants could access their own private 'accounts' as well as communal areas. A tutor's section was set-up, where SpRs could 'send' completed work but not view files submitted by other SpRs.

Incorporating individual 'accounts' into the website (as opposed to establishing a general site accessed by a single password) enabled a more dynamic approach to the website development. This enabled:

- User identity, promoting a sense of belonging and 'ownership' towards the website. All participation with on-line activities, such as discussions, quizzes and messages to other users and tutors would be accompanied by the sender's name
- The recording of statistics that reflect individual user participation with the site
- E-mail independent messaging, allowing SpRs to send private messages to each other and tutors
- The production and maintenance of a personal web page by each participant from any web-browser
- A searchable, personal archive of past work attempted and messages received from other users.

## TASKS AND ACTIVITIES DEVELOPED FOR THE SITE

It was decided to incorporate a number of tasks that could be undertaken on-line, requiring various levels of sophistication to implement. Tasks were set on a monthly basis excepting August which was designated a rest month.

Activities set were designed to support the formal monthly study days. The tasks included:

- An interactive quiz based on a real clinical case history to test diagnostic and clinical management skills. Users worked through a series of steps, responding to new information presented at each stage. Each attempt generated a transcript, merging correct answers (including notes and 'common errors') with the trainee responses. A copy of each transcript was stored in the SpR's personal folders, protected from the view of other SpRs, and the other was sent to the tutors for evaluation. A feedback window in the form of a textbox in the tutor's copy could be used to write comments directly into the SpR's copy
- A radiology quiz that could be completed in a single step. The quiz required SpRs to answer questions relating to an X-ray image digitized using a Kodak DC40 digital camera and rendered to the web
- A single-step multiple choice question-style exercise where SpRs checked boxes corresponding to correct answers. This type of 'digital' data made it possible for the computer to automatically score the SpR's attempts with no tutor involvement. Content was based upon the preceding study day
- A discussion-based journal club initiated by a different SpR monthly. Users could asynchronously debate topics relating to the journal article set
- A summary of the preceding months study day compiled by two nominated SpRs
- A facility to submit suggestions for the content of forthcoming study days
- A notice board including the forthcoming programme with dates and venues. Any urgent information to be communicated from the Specialty Training Committee. Full job descriptions of all the current posts within the region
- A hyper-linked list of other relevant respiratory Internet sites.

## PROJECT LAUNCH AND METHODS OF ANALYSIS

The details of the project were introduced to trainees 3 months before the project launch. A structured questionnaire was given to all participants requesting information about their baseline computing skills, IT usage, perceived needs and expectations of the project. Specific questions were asked about frequency of computer use (log-ons per week), time spent using computers (hours per week), and whether trainees regularly used computers to access pathology results, word process, learn from educational packages, use e-mail, the internet, spread sheets, statistical packages, games or personal organizers, and finally for non-specific curiosity in the potential of computers. Trainees were asked to state if they used computers for these activities 'never', 'sometimes' or 'often'.

A second questionnaire was sent out on completion of the pilot project to assess computing use at this stage to examine changes in IT usage and skills that had occurred during the pilot project. The results were used both descriptively and analysed where appropriate using $\chi^2$ or Wilcoxon matched pairs signed ranks test.

SpRs attended a study day during which the trainees were given a verbal and visual demonstration of the system and its rationale. There followed an opportunity for individual hands on experience. All trainees were given telephone helpline numbers in case of log-on difficulties.

Internet access was provided by individual training sites through commercial Internet service providers. Internet access was usually provided in the postgraduate library facilities of the host hospitals. Librarians from these locations attended a pre-launch training day to enable them to assist SpRs who were having difficulty accessing the site. The Internet training site was then officially launched. Throughout the 5-month running time of the pilot project, informal comments were invited from the trainees via e-mail or telephone.

All access to the server was automatically recorded with details of individual log-in times, dates, duration of log-in, exercises attempted and completed for each month.

## RESULTS

Frequency of computer use by trainees before the programme was self reported as 'never used' 5%, used less than once a day 34%, used daily or more often 61%. Of those SpRs who used computers the following activities had been experienced at some time: word processing 88%, computer games 59%, accessing hospital records 53%, spreadsheets 48%, computer teaching programmes 24%, statistical analysis 14%, and palm-top/personal organizer use 17%. Positive SpR statements of expectations, established from the questionnaires are summarized as follows, ranked most commonly stated first:

- Improved access to information generally
- Greater communication between trainees
- Ease of learning at own base hospital or home
- A new source of information
- A better method of teaching, an opportunity to learn about the Internet
- Possibilities of improving research links and access to research data
- An opportunity to learn more about the training programme.

SpR reservations involved the technical difficulties of learning to use the Internet and website and lack of availability to Internet-linked terminals in their work places.

During the 5 months of the active programme, website activity by SpRs was measured by the number of server 'hits', recorded and archived in the server log-file. Twenty nine (76%) of all trainees attempted at least one of the set exercises. A total of 3479 log-ins were recorded by the server in total. As a percentage of total activity 30% took place in June, 28% in July, 11% in August (rest month), 23% in September and 4% in October.

The most significant problems encountered by the trainees are shown in *Table 1* (ranked in order of fre-

quency). The paired data from the two questionnaires demonstrated statistically significant increases in some but not all areas of computer use described in *Table 2*. In contrast the average self-estimated number of computer uses per week was median 4 (range 0–70) before and median 7 (range 1–84) after (non-significant; $\chi^2$ test) and total time per week spent using computers was also unchanged.

## DISCUSSION

This study has demonstrated the feasibility of establishing an Internet-based distance learning programme for specialist medical trainees at geographically distant sites. Factors have been identified that facilitate or hinder this format of project. The reorganization of postgraduate medical education for specialist trainees in the UK requires coordination and standardization of teaching across geographically distant regions encompassing multiple sites. Regulation in this form encourages the application of distance learning and the Internet is the medium with the greatest potential. The questionnaire responses from our trainees supported the concept of Internet training, seeing it as an opportunity to broaden access to information in general while recognizing the opportunities to study flexibly either in their own homes or at times suitable to them within a busy clinical commitment.

Their main reservations before the start of the project concerned poor baseline computing skills and access to terminals points. These hindrances were confirmed by feedback received during the project run time. Acquisition of computing skills is perceived as desirable in the training and successful functioning of medical practitioners (Kinn, 1996) and is included within the core curriculum of general (internal) medicine training within the UK (Royal College of Physicians, 1996). University medical schools now feature computing skills as part of the undergraduate curriculum.

Within the UK this forms the base for most computer learning and educational research in medicine with very little published data available on the application of computer-assisted learning in postgraduate medicine.

Before the project only 61% of trainees used a computer each day and 47% had no prior Internet experience. The pre-launch training session helped some of the less confident trainees but there was a definite relationship between time lapsed since training and successful log-on. Those delaying application of their newly acquired knowledge beyond a month were more likely to encounter simple problems with log-in and search navigation supporting the idea that learning should be applied soon after it is acquired (NHS Executive, 1996). Reflecting this, some trainees failed their initial attempt to log-on and did not try again.

Lack of Internet access was an anticipated problem. Both this and limited baseline IT experience is likely to become less important as more hospital departments host their own links and individual trainees purchase personal home connections. There is a case to be made for the regional training programme financing the modem

**TABLE 1.**
**Difficulties in computer/internet use encountered by trainees during the project and proffered solutions**

| Problem | Detail | Solution offered |
|---|---|---|
| Technical | Failure of software and web-server: varied from minor faults to complete server failure. Server overload at weekends or evenings | Bugs fixed. Original server upgraded with purpose-built web-server. Software applications simplified |
| User | Trainees unable to use a web-browser to locate web-site. Trainees unable to respond to low level 'error messages' generated by web-browser. Difficulty in following on-screen instructions. Unable to remember log-on procedure or recall password | Local librarians assisted trainees on site. Phone line advice offered |
| Access | No internet access available at some hospital sites. Ineligibility of NHS trainees to use JANET connections in teaching hospitals | Trainees encouraged to purchase home internet connections. Connections at some hospital libraries subsidised by project fund. Arrangements made with Universities to allow named registrar access via JANET |
| Equipment | Poor quality of X-ray images. Lengthy download time of images. Slow connection time of web-site menu page | Purchase of high-resolution digital camera. Careful selection of X-ray images and software manipulation of images. Replacement of complex graphical buttons and backgrounds to produce simple and rapid download menu page |

**TABLE 2.**
**Questionnaire responses concerning computer use from trainees pre- and post-involvement in the Internet project**

| Computer use | Some or frequent usage before | Some or frequent usage after | Z value | Significance of change in usage |
|---|---|---|---|---|
| Word processing | 88% | 100% | −1.34 | n/s |
| Statistics/spreadsheets | 59% | 88% | −1.47 | n/s |
| Access records/results | 53% | 88% | −2.19 | *P*=0.028 |
| Games | 59% | 59% | −1.34 | n/s |
| Teaching packages | 24% | 53% | −2.02 | *P*=0.04 |
| Personal organizer | 17% | 25% | −1.60 | n/s |
| E-mail | 41% | 82% | −2.17 | *P*=0.03 |
| Internet | 53% | 88% | −2.20 | *P*=0.029 |
| Curiosity | 6% | 53% | −2.52 | *P*=0.012 |

Trainees were asked to indicate computer use in the following categories as 'none', 'some' or 'frequent' Analysis using Wilcoxon matched pairs signed ranks test. n/s = not significant

and commercial connections to facilitate this process, while free Internet access has now become available, reducing the financial burden.

Technical problems could be overcome by simplifying the software and upgrading the server capability. Letterie et al (1994) demonstrated that improved learning outcomes are possible using e-mail alone. If such a technology, low in computer interactivity but with high interpersonal participation, can show improved learning, then perhaps a fairly simple technology model may be required. This project has attempted to provide a high level of computer interactivity for SpRs.

It may be argued that the value of computer-assisted learning for postgraduate education has not been adequately explored (Kean et al, 1991) and while complex programmes offer greater choice and flexibility, their effectiveness in a relatively computer naive postgraduate medical setting remains unproven. The paired questionnaire data suggested that trainees increased their IT experience generally by the end of the project (*Table 2*). The time spent using computers and the number of log-ons per week did not significantly alter during the project run time but the type of usage did. More trainees overall used computers and did so for more functions.

While e-mail and Internet use may be expected to rise, experience of computer teaching programmes, and accessing patient computerized records and results are less obvious benefits. The clue to the transfer of skills may be in the area of change which reached greatest statistical significance 'general curiosity use'. It is possible that encouraging trainees in one area may stimulate a more general interest in IT facilities.

Participation in the project at 76% of all trainees was satisfactory, although less than 50% attempted exercises each month. Participation also fell away after the initial 2 months. Trainee feedback reported that this was as a result of lowered enthusiasm resulting from practical difficulties referred to above. In order to build on this experience we would recommend greater initial computer training of participating individuals backed up by reinforcement sessions and provision of Internet access at least at department level on each site and optimally within the home of each trainee. The learning content of the programme must be immediately relevant to the needs of the participants.

The educational impact of the project was not studied directly but a number of interesting observations were made. The case studies and radiology quizzes were most often completed. The interactive nature of the programme meant that some participants spent considerable time attempting to 'better' their scores. Others objected to the 'examination' format, arguing that this type of assessment was inappropriate for their level of training.

Nevertheless this approach provides the potential for not only assessing learning from the formal study day curriculum but also allowing comparisons across regions. In contrast to these familiar medical teaching methods the innovations of allowing trainees to input their preferences for forthcoming meetings and the 'ask the expert' sessions proved less popular with little participation. The summarizing of formal study days was always completed, however, and proved useful for those unable to attend. These observations may reflect the influence of a lengthy prior exposure to traditional medical teaching methods.

The results of this pilot scheme have been used to set up a second Internet-training scheme in 1998, North East Thames Thoracic Society Specialist Registrars Internet Environment (NETTS-SpRite), using a commercially available Internet conferencing system. The trainees have suggested changes to the content of the programme. A steering group has been formed to develop a website to provide medical information for patients and extend the conferencing capability of the project to other regional respiratory SpR groups in North West Thames, Wales and Scotland. **HM**

*This work was supported financially by the North Thames Deanery and the Forest Hospitals Medical Education and Research Trust.*

Department of Health (1993) *Hospital Doctors: Training for the Future. The report of the working group on specialist medical training.* HMSO, London

Kean DR, Norman GR, Vickers J (1991) The inadequacy of recent research on computer-assisted instruction. *Acad Comput Med* **66:** 444–8

Kinn S (1996) Information Management and Technology (IM & T): training provision in postgraduate medical education. *Med Educ* **30:** 367–70

Letterie GS, Morgenstern LL, Johnson L (1994) The role of an electronic mail system in the educational strategies of a residency. *Obstet Gynecol* **84:** 137–9

NHS Executive (1996) *Institute of Health and Care Development.* Health Informatics in Post Graduate Medical and Dental Education, Joint Working Group Report. NHS Executive, Leeds: 7

Royal College of Physicians (1996) *Joint Higher Committee on Higher Medical Training. Curriculum for higher Specialist Training in General (Internal) Medicine.* Royal College of Physicians, London

## KEY POINTS

- Regional training programmes for medical specialists may benefit greatly from the use of distance learning via the Internet.
- Trainees show initial enthusiasm for Internet-based learning.
- Enthusiasm wanes in the face of technical difficulties.
- Information technology skills are at an elementary level in many trainees.
- Technical support and ease of access to computers and Internet points facilitates participation in Internet-based educational activity.
- Specialist medical trainees appear reluctant to use new forms of self-directed learning and are more likely to participate in traditional answer and question based exercises.