Enhancing the Learning Opportunities of Part-time Postgraduate Students Whilst Off-campus – Periodic Self-Assessment of Image Reporting Skills Using Blackboard.

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Abstract:

The PgCert Advanced Practice (Gastrointestinal Imaging) programme was the first in the UK to prepare radiographers to write a diagnostic report on x-ray examinations of the lower gastrointestinal tract (colon and rectum), a task traditionally undertaken by specialist doctors known as radiologists. This 12-month postgraduate programme comprised blocks of university study with intervening periods of clinical practice. In module evaluations previous students reported feelings of isolation and loss of motivation during these lengthy clinical periods away from the university. This project aimed to enhance learning and on-going support whilst off-campus, utilising Blackboard, the university's virtual learning environment, to host an interactive study package for the development of image interpretation and report-writing skills.

In the initial phases of this project a database of carefully selected and verified examples of gastrointestinal x-ray examinations (cases) was sourced and housed within Blackboard, and these were released to students at set intervals. The students analysed each case and then reported their findings into an online forum known as the Blackboard discussion board, enabling students to view and compare differing report-writing styles. A facilitator guided the students, feeding back the verified definitive (actual) report and encouraging self and peer review. An initial campus-based training session was evaluated to explore both student and facilitator perceptions of the ease of use and educational value of the study programme. This was then followed by off-campus delivery of the study package. Whilst initial difficulties were encountered during the development of the database of examinations, the students valued the regular formative assessment and feedback from their peers and facilitator. In the next phase of the project the study package will be evaluated as a tool for auditing the reporting skills of already-qualified practitioners as part of their lifelong learning / continuing professional development obligations.

Context

Radiographers are registered health care professionals who are responsible for the production of high quality medical images such as x-rays. Traditionally these images were then transferred to a radiologist (specialist doctor) who "interprets" the images and issues a diagnostic report to the referring clinician. Over the last decade radiographers have developed their practice to include the interpretation and reporting of a range of medical images. This was partly in response to a national shortage of radiologists, but was facilitated by the enhanced educational status of radiographers, with graduate-level entry to the profession introduced approximately ten years ago. The reporting of medical images by radiographers is now well established in several radiological specialties including medical ultrasound, skeletal trauma, mammography (breast imaging), and gastrointestinal radiology.

Examinations of the lower gastrointestinal tract (colon and rectum) are often undertaken in patients with suspected cancer. Bowel cancer is the second most common cancer in the UK, yet if it is identified and treated at an early stage it can have an excellent outcome. This has prompted the recent introduction of a bowel cancer screening programme into the UK and several other countries. However x-ray examinations of the colon and rectum have been identified in the literature as being problematic to interpret due to a high level of perception errors (Hassan 2005; Halligan et al, 2003; Markus *et al.* 1990), where a pathology is present but not identified on the images by the radiologist. These "false negative" errors may include missed cancers or pre-cancerous polyps which have potentially serious consequences for the patient (RCR 2002). This has prompted a number of authors to recommend a "double reporting" system to overcome this (Leslie and Virjee, 2002; Markus et al 1990), whereby two trained individuals report on the images separately and then reach consensus agreement. This follows the principle that "two pairs of eyes are better than one". Several studies have suggested that radiographers could contribute to double reporting (Booth and Mannion, 2005; Murphy et al, 2002), but these lack transferability as they are based on individual in-house training courses.

The Postgraduate Certificate in Advanced Practice (Gastrointestinal Imaging) programme provided by the University of Salford was introduced to overcome these limitations, and was the first course in the United Kingdom to offer combined academic and clinical training for this role. The programme has been taught successfully since 2001, using block release over twelve months with intervening periods of clinical practice. Students attend the University for one week every three months, where they gain the underpinning skills and theory necessary for the report-writing role. When they return to their employing hospital for clinical practice

they apply this knowledge under the guidance of a clinical mentor. The innovative and flexible method of delivery attracts students from across the UK, but is not without problems. The clinical blocks are lengthy, and in this time it is easy for the student to experience feelings of isolation and loss of motivation, a problem also identified by Harun (2002). The clinical experience offered within each placement is also variable, with some students experiencing a wide range of pathology, whilst others encounter a very limited range. Similarly there were concerns that the students became "entrenched" within the particular ways of working encountered within their base hospital, rarely having the opportunity to explore image interpretation and report writing styles adopted by people other than their own mentor. This could potentially produce a parochial inward-looking practitioner.

Whilst on clinical placement the students were supported through email and had access to the Blackboard virtual learning environment (VLE). However it became apparent that interaction with Blackboard was rather passive in nature, and there was huge potential for Blackboard to be used in a much more innovative way. Examples might be to provide on-going e-learning and support for the students, offer feedback on progress, and prepare students for their summative (report-writing) assessment. A review of relevant literature suggested that e-learning and the use of virtual environments in radiographer / radiology education, although in its infancy, is becoming a popular adjunct to traditional learning methods (Scarsbrook, *et al.* 2005(a); White and Cheung, 2005). Indeed the relevant professional bodies for radiographers and radiologists are strongly recommending a move towards online learning and self-assessment for their trainees (Scarsbrook, *et al.* 2005(b); College of Radiographers, 2006) underpinned by the development of an associated national verified case archive (*Ibid.* 2005b). Recently a small-scale project at the University of Salford demonstrated the potential of the Blackboard VLE for linking clinical and academic learning, making some strides towards encouraging regular student participation off campus (Newton-Hughes and Robinson, 2005). In other health disciplines this has been taken a stage further, with some academic programmes being completely transformed into e-learning packages (Avery et al, 2003; Mulholland 2003). An internally funded project was therefore launched with the aim being to enhance the learning opportunities of part-time postgraduate students whilst off-campus, by introducing periodic self, peer and tutor assessment of image interpretation and report writing skills using Blackboard.

The Project Outline

In order to meet these aims, the project sourced a database of carefully selected and verified gastrointestinal radiology cases, and housed them within Blackboard. The cases were released to students at set intervals of time. The students analysed each case and then reported their findings into the discussion board, enabling students to view and compare differing reporting styles. A facilitator guided the students, feeding back the verified definitive report and encouraging peer review. An initial campus-based training session was evaluated to explore both student and facilitator perceptions of the ease of use and educational value of the study programme. This was then followed by off-campus delivery of the study package, and subsequent evaluation. The project was broken down into several distinct phases as shown in Table 1 :

Table 1. An outline of the five phases of the project, and method of evaluation.

Phase	Focus	Outline	Evaluation	Comments
1	Case acquisition	Acquire a bank of 30 suitable gastrointestinal cases (10 for pilot). Accompanying diagnostic report and clinical indications.	30 cases acquired by end of project.	Images must be in a suitable digital format, thus limiting the potential sources. Cases may involve up to 16 images (data storage problems).
2	Case Verification	The accompanying diagnostic reports were compared to reports written by a panel of "experts", to ensure that a consensus was reached (reduces ambiguity).	All cases verified and agreed report stored on a database.	The methodology used to verify the appropriate cases (3 separate reports which reach consensus) follows traditional, quality assured practice within radiology.

		Where consensus agreement was not possible, alternative cases were sourced.		
3	Developing the teaching package	Framework identified for uploading and displaying cases on Blackboard. Each case was to be linked to the Blackboard Discussion Board. Students were to interpret the images and then write their findings within the discussion board. This would enable students to view and compare differing reporting styles.	Feedback from project team and clinical facilitators	Large image file sizes encountered in medical imaging may result in long download times, particularly if accessing without Broadband connections. Finding a small file size with excellent image resolution was potentially the greatest challenge within this project.
4	Piloting	Campus-based training session delivered by the project co-ordinator during the third week of university attendance (approximately half way through the year long programme). The purpose and layout of the on-line package was explained (Figure 1), and students were guided through the first of four cases. Minimal assistance was then offered for completion of the remaining cases. Following completion of the 4 cases, a facilitator re-visited each case with the students, placing the definitive (verified) report onto the discussion board. The facilitator encouraged participation of all students to explore the different report writing styles, highlighting examples of good practice.	Student questionnaire Observation of usability Statistical analysis of software External usability assessment	A campus-based session was delivered to familiarise the students with the training package, and to ensure that staff were on-hand to assist with any technical problems as they arose. It also provided an excellent opportunity for evaluation of both the ease of use of the software and the learning experience.
5	Delivery and external assessment	Off-campus delivery of the study package. Consider potential for use as an audit tool for qualified reporting radiographers.	External assessment by 2 clinical experts	Selected cases were subsequently released to the students at intervals whilst on clinical placement. A facilitator fed back the definitive report and promoted debate. The external assessors will evaluate the complete

				learning package (assessment of subject relevance / suitability) at the end of the project.

This article will explore only the results of the pilot phase (phase 1-4), including the evaluation of a campus-based training session. Two weeks after this session the first off-campus session took place, with further cases released to the students at four weekly intervals. Two independent clinical experts are scheduled to evaluate the learning package to see whether they feel that it has transferability to other similar situations.

The Pilot Phase Methodology

The sourcing of images in Phase 1-3 was particularly problematic during the initial stages of the project, as image file sizes were too large to enable fast downloading times. A JPEG configuration with lossless compression was adopted, but the physical image sizes were found to be too small for image interpretation (covering less than 1/3rd of the screen). A compromise solution was found, with minimal loss of resolution and images covering approximately half of the screen. Once the format had been agreed, a number of cases were sourced and loaded onto Blackboard ready for verification, although it took longer than anticipated to reach the required number of cases. The panel of experts viewed each case and verified the diagnostic reports which accompanied the cases with few exceptions or amendments, and the agreed reports were stored on a database (not visible to students). An image display format was agreed, whereby the case clinical details were placed at the top of the screen, the individual thumbnail images down the left hand side, and the selected image occupying the rest of the screen (Figure 1 and 2). A hyperlink was provided to the Blackboard Discussion Board, enabling students to write their report / findings into the appropriate discussion forum (Figure 3). A facilitator then posted the definitive report and any appropriate comments to the group or to individuals (Figure 4).

The piloting of the tool involved a campus-based training session, enabling both observation of the tool in use, as well as an opportunity for student and facilitator feedback. Whilst methods such as nominal group technique and interviews were considered for the student evaluations, a questionnaire was felt to be the most appropriate means of gaining the relevant information, as different questions could be administered at various points within the training sessions. It also ensured anonymity of the student responses. A number of existing validated usability and learning technologies questionnaires were considered (eg. QUIS Questionnaire for User Interaction Satisfaction), but these were often focussed into evaluation of a larger entity such as a complete website or virtual learning environment. A bespoke questionnaire was therefore designed based upon some of the principles of software evaluation (Neilson, 2005) underpinning the validated questionnaires, but enabling much more focussed evaluation of the software package as a learning experience. The questionnaire explored prior experiences of using IT, evaluation of the software, and evaluation of the learning experience (Appendix 1). Section 1 of the questionnaire (completed before the training session) aimed to discover the student's previous experience of, and access to IT, to identify whether this may influence their perceived ease of use of the learning package. Section 2 was focussed towards evaluation of the ease of use of the software, and was developed following additional background reading into the general principles (heuristics) of user interface design and usability testing (Nielsen, 2005; Dix et al, 2004). Section 3 was focussed towards an evaluation of the software tool and the training session as a learning experience, and asked questions related to the next "off campus" phase of the project. To increase the validity of the questionnaire it was piloted using two clinical experts who had also recently been introduced to the learning package. Only minor changes to layout were suggested.

Results: Project Co-ordinator Feedback

During the campus-based training session, the project co-ordinator observed the students working through four cases, and identified one or two specific problems during this session. These included poor viewing facilities caused by insufficient black-out curtains which interfered with image interpretation. Poor image quality reported to the co-ordinator by one student was easily improved by changing the monitor brightness and contrast. A number of "repetitive" errors being made by the students caused some frustration, included clicking on the wrong buttons. Statistical analysis of the package showed that students required an average of thirteen minutes to view, interpret and write their report on each case. This was useful information as it guided the project team in terms of the numbers of cases that should be released at any one time (no more than five cases), and the potential timeframe that students would need to set aside to complete the task "off campus".

Questionnaire Results

Eight students completed the questionnaire. Section 1 identified that the respondents (seven females and one male) were all mature students, evenly split between the age groups 21-40, and 41-50. All had access to computers both at home and at work, and these included broadband internet connection and email access. Two students commented that internet access was limited to certain sites at work. Figure 5 shows that they have all had at least some experience in a range of IT packages such as using Microsoft word and sending emails, but limited experience in using the Blackboard Virtual Learning Environment and online discussion forums or bulletin boards.

Section 2 focussed on evaluation of the software. All students felt confident to use the software unaided after completion of 2 cases, with minimal input from the tutors for the 3rd and 4th cases. 5 students identified that navigating around the system was "not too difficult", with 3 students perceiving the system as "quite easy" or "easy". However, six students had made mistakes such as pressing the wrong keys (see figure 6), although seven out of eight students noted that it was easy to rectify such mistakes. Two of these mistakes were commonly occurring and were also identified by the project co-ordinator during the observation period. These included a tendency for the cases to automatically "minimise", and for students to select the wrong box when viewing reports in the discussion board, resulting in an unwanted attempt to email the report author. Seven of eight students noted that writing reports into the discussion board was "straight-forward", and none found that moving between the cases and the discussion board to be problematic.

Seven of eight students found that the layout of the images were appropriate and consistent, but only 2 felt that the images were laid out in an order which mimics their clinical practice (Figure 7). However two respondents noted that there is no single way of viewing images in clinical practice, and that whilst the images were not presented in their preferred sequence, they felt that the images were still negotiable. Students were asked whether the image quality (contrast, resolution, physical size) was acceptable, and there were mixed responses (Figure 8). However most students did appreciate that there was sufficient image quality to enable them to make a reasonable judgement in a "formative" setting.

Six of eight students felt that there was sufficient clinical information (patient presenting symptoms) present to make a judgement on the images, and they considered these cases to be either "quite difficult" (5/8) or "straight-forward" (3/8).

Section 3 focussed upon the evaluation of the learning experience. Students were asked whether they felt uncomfortable allowing their reports to be viewed by their peers. Five of the eight students were not worried about this, with three of the eight stating that they felt a little uncomfortable. However all felt that this uncomfortable feeling would reduce over time. All believed that it was useful being able to view other student's reports, citing a range of reasons (Figure 9). All students had found the facilitators comments useful. When asked whether they would be interested in continuing the reporting exercises off campus, all said yes, with one requesting that it was on a voluntary basis. The students were divided over the length of time they would need to complete four cases in clinical practice, with the majority suggesting 1-2 weeks would be adequate. Most of the students stated that they would complete the cases at home rather than at work, as they would not be interrupted.

In a "free comments" section at the end of the questionnaire, several students noted that the session had been very helpful, and that they are now more confident accessing Blackboard and the cases. Two students noted that they must remember to check their Blackboard and emails more frequently when in clinical practice, as between academic blocks they had tended to "switch off" from their studies. Several students noted that comparing the reports with each other, and the debate that ensued between the students and the facilitator was valuable.

Discussion

Whilst the evaluations have been generally very positive, students and facilitators have noted that some cases do not appear to have optimum contrast and resolution. As anticipated, image quality is unlikely to rival that found within the clinical placement when dedicated image viewing software with high-resolution monitors are used. The appearance of any image will always be limited by the quality and resolution afforded by the computer monitor, and those used in university computer laboratories and students' personal computers will generally not have the resolution to rival those used in the clinical setting. Similarly students have commented

that the software package does not enable the use of important image manipulation tools (such as zoom and edge-enhancement). Whilst these issues are not a significant problem for these formative exercises, the programme team wish to develop online summative reporting assessments in the future. With the current limitations, we do not feel it is appropriate to assess students on sub-optimal images. However, as radiology departments increasingly switch over to fully digital (filmless) operation, we will be able to begin importing images without any loss of resolution. Recently DICOM (digital imaging and communications in medicine) standardised image display and compression tools have been adopted by x-ray equipment manufacturers (Graham et al, 2005), enabling easier transfer of images from one site to another. Recent purchase of computed radiography equipment by the University of Salford will facilitate such image transfers, and a new free software package (K-PACS) is currently being explored which will offer a range of image manipulation tools. The learning package evaluated within this project should be seen therefore as one that is in transition as new technology becomes available.

Students also commented on several "repetitive" errors being made, including clicking on the wrong buttons and minimising the screen. As five of the eight students had indicated that they had no previous experience of using online discussion forums or bulletin boards, the concept of writing reports into the discussion board was being introduced to many of them for the first time, so some errors were to be expected. However a recent Blackboard software upgrade has reduced the potential for these mistakes, and a help file will be created to guide students to "undo" any mistakes. A help file could also be useful to guide students and facilitators in optimising the effectiveness of the learning package. For example, some students had noted poor viewing conditions due to insufficient "black-out" conditions during the training session. Glare on the computer monitor can make image viewing difficult, and this could also potentially be a problem when working through the cases at home and at work. Again this should be incorporated into a help file, ensuring that viewing conditions are optimised before commencing the cases. For one student who alerted the facilitator to the fact that brightness and contrast were too poor to report on the cases, this was easily resolved by altering the contrast and brightness dials on the monitor. Again, a reminder on a help file to check monitor controls, particularly where equipment is shared with others, would be valuable.

Whilst the pilot evaluations have identified some areas where improvements could be made, the opportunity to participate in these e-learning opportunities have been welcomed by both the students and the project team. Although three of the eight students indicated they felt initially self-conscious when entering their reports onto the discussion board, they all acknowledged the benefit of being able to view and evaluate different reporting styles (Figure 9). Two student's comments indicated that peer and self assessment was indeed being put into action :

> *"It was helpful to see other people's wording and then compare to your own report"*
>
> *"People phrase things differently, some people use many words but come to the same conclusion with no additional information".*

Similarly, following a tutor's posting of the actual report and some additional feedback (Figure 4), statistical review of the Blackboard site showed that all students had re-visited the cases and each other's reports, with several posting further comments and queries. The facilitator has therefore an important role as a catalyst in ensuring that students make the most of the learning experience, and they must be vigilant in checking for further postings and queries. Feedback from the facilitators has also suggested that they need to develop new skills to manage the process effectively. In particular, encouraging mature students who are qualified professional health workers to post their "answers" onto an open discussion forum is something that is new and potentially intimidating to many tutors and students alike. Facilitators need to be mindful of the individual students who may have made an incorrect report, giving constructive and supportive comments which will encourage them to keep trying and will reduce any feelings of embarrassment or inadequacy. With tactful feedback, the benefits of this form of distance learning and self, peer and tutor support are potentially wide-ranging.

Following the campus based training session, all students indicated that they would like to continue with these sessions "off campus", with one student noting that this should not be mandatory. The first "off campus" session provided students with a further 4 cases to complete, with 7/8 students posting a report on the discussion board. Due to anonymity of the questionnaires, it is not clear whether the one student who did not take part in this session was the one who felt it should not be mandatory, but this did raise several questions

for the project team. If these sessions were not mandatory, then some students could opt out from contributing a report, but could still access the cases and the other students' reports and tutor feedback. This could be perceived as unfair, as they could reap the benefits of the other students' hard work. At this stage we do not have an answer to this difficult question, but it one that is often encountered in different types of group work such as problem-based learning, where the minimal contributor may still have access to the work undertaken by the group. We therefore will be vigilant in monitoring and encouraging participation over the following 12 months.

Conclusion and Recommendations

Whilst this project has not yet come to its conclusion, it is clear from the pilot phase facilitator and student comments that it does have value in enhancing learning and support to students whilst off-campus. Prior to this project students rarely engaged with their tutors and each other during the clinical blocks, and this has the potential for students to suffer from isolation and loss of motivation. By encouraging them to actively engage with Blackboard at intervals within the clinical placement, we are introducing more effective distance learning, which enhances the link between academic and clinical learning objectives. The interaction with facilitators will better prepare students for their summative reporting assessments, as they will not only be able to assess themselves against the "definitive" report, but they will also have access to viewing other student's strategies for report writing. This formative feedback will enable areas of strength and weakness to be identified. Following an external assessment of the learning package by two clinical experts, we hope to expand the case bank further for this programme of study. Information gained from this project can be directly transferred to other radiography programmes, as setting up a similar case database will be easier now that we are aware of some of the pitfalls and problems that may arise. Similarly there may be transferable outcomes to other academics interested in developing work-based and distance learning to include online delivery, using visual images to prompt discussion and participation by students.

Previous students have expressed an interest in gaining access to this new case bank, in order to "test" their image interpretation and report writing skills against a validated case archive. This opportunity does not currently exist in the UK within this particular speciality. Qualified reporting radiographers have a requirement to engage in lifelong learning and audit their practice at regular intervals, and this may be a more transferable audit tool that the "in-house" mechanisms that they currently use.

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Figure 1. Screen dump showing the Case Study section of the VLE. The individual case studies are available within folders as shown.

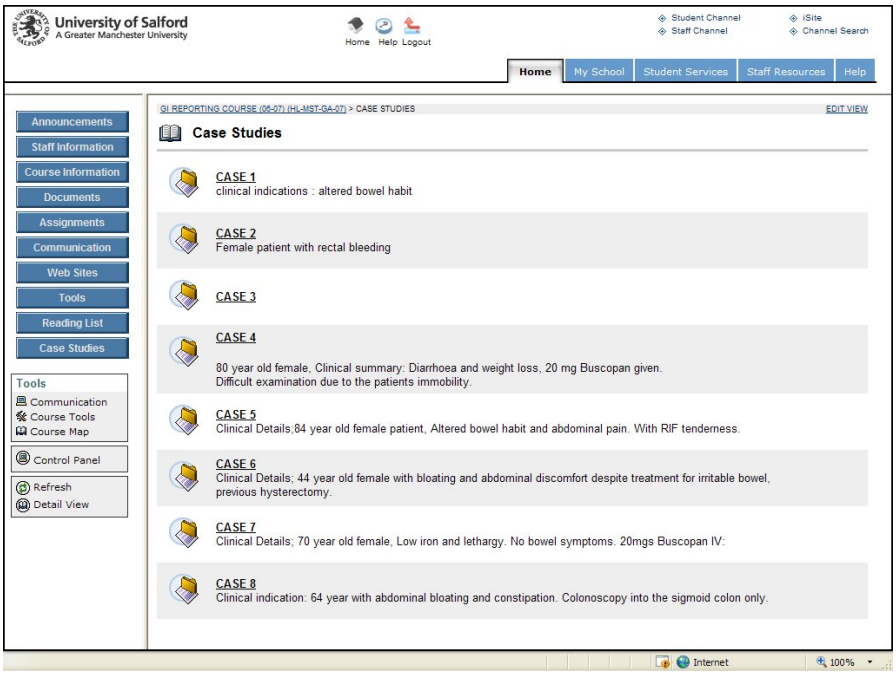

Figure 2. A screen shot demonstrating one case. Clinical details are posted along the upper screen. Thumbnail images from the case are positioned in the left hand column. Clicking on a thumbnail image demonstrates the full size image.

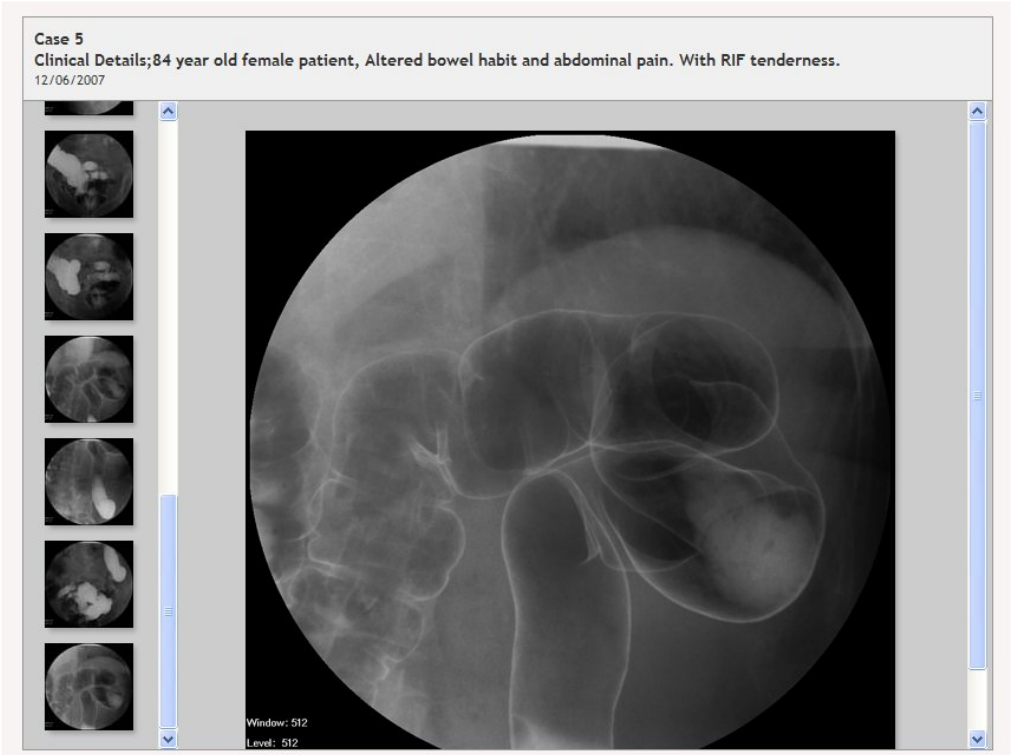

Figure 3. Each case folder has a hyperlink to a discussion forum. Case 2 images and related discussion board folder is demonstrated here.

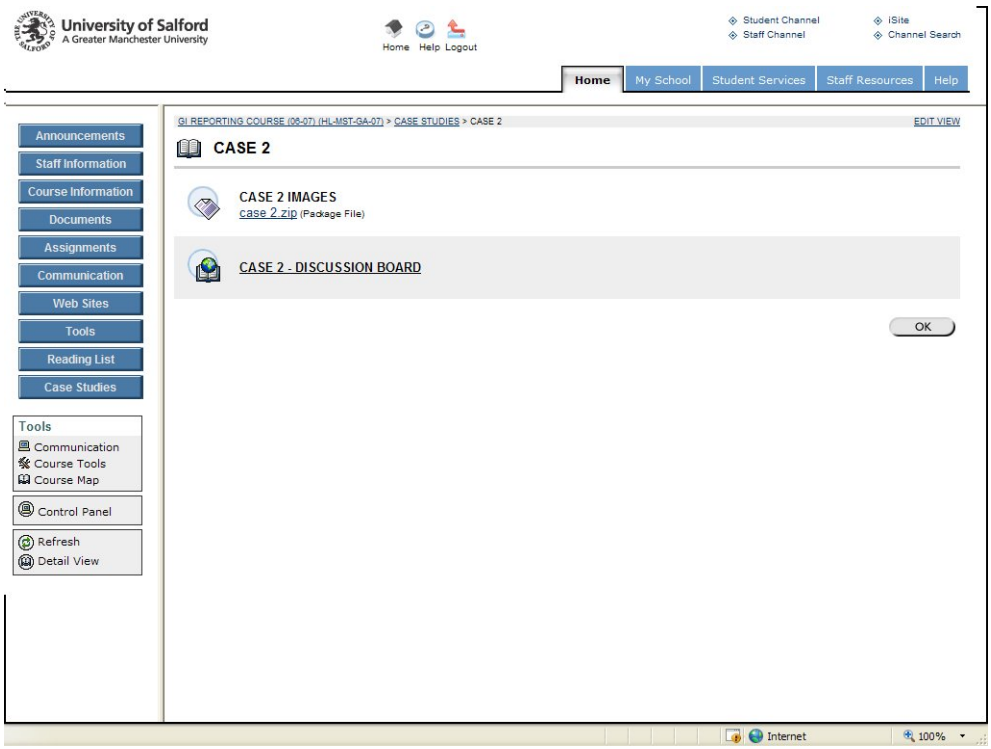

Figure 4. An example of generic tutor feedback, signposting the students to re-visit the case, and promoting further debate.

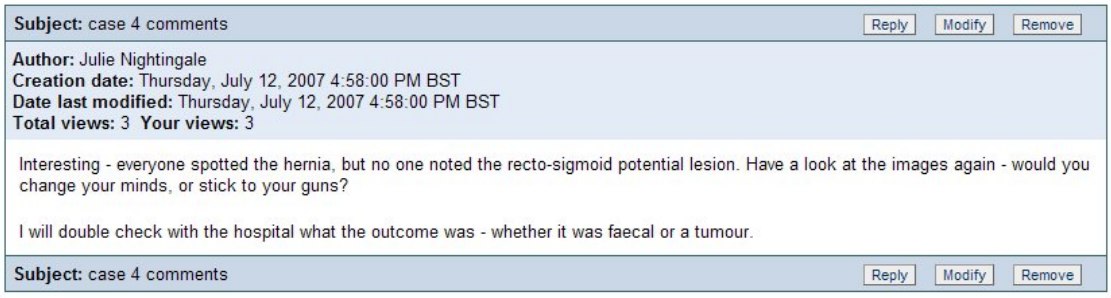

Figure 5. Student perceptions of their experience in using IT / computer applications.

Domain	No experience	Some experience	Proficient	Expert
Sending and receiving emails		4	4	
Searching the internet		5	3	
Creating documents in Microsoft Word		5	3	
Using the Blackboard Virtual Learning Environment	1	6	1	
Using online discussion forums or bulletin boards	5	3		

Figure 6. Mistakes and errors noted by the students.

- When selecting a case, instead of opening on screen it reduced / minimised to the bottom bar automatically. Had to ask the facilitator how to re-open it (3 students).
- Clicked on the wrong button and it closed the whole programme on to the desk top.
- Typed a full report then accidentally closed the programme, and had to re-type.
- I did not realise at first that there were more thumbnails available if I scrolled down.
- When I wanted to look at someone else's report, I clicked on their name instead of the subject box, and it automatically tried to email them. (6 students). (N.B. An upgrade of Blackboard has prevented this from happening since this evaluation).

Figure 7. Student's comments regarding whether the image sequence mimicked that used in their clinical practice.

- The images didn't appear to follow the logical sequence of anatomy.
- They should be presented from the rectum to the caecum.
- Some seemed to start at the caecum – this is not how I would report images.
- Some had the rectum / caecum in the middle, but I still found it easy to negotiate.
- Everyone takes and displays their images in a different order, so you can't please everybody.

Figure 8. Student perceptions and comments regarding the quality of the images.

- Would be helpful if there was a zoom or magnification option.
- Appears a little unsharp on some images.
- Difficult to be certain about some image appearances, but this may be due to the room conditions being too light.
- Images a bit too dark and too small.
- Only spot films are available – it would be useful to see the overcouch (full size) images.
- I thought the image quality was poor, but when I altered the contrast and brightness on the monitor it was fine.

Figure 9. Student perceptions of being able to view each others reports.

- Helpful to see other people's wording and then compare to your own report.
- People phrase thing differently, some people use many words but come to the same conclusion with no additional information.
- Useful to see how other people describe pathology.
- I am not used to viewing images in this way, it is a little unsettling but I will get used to it.
- I missed most of the pathology which was disappointing, and a little embarrassing, but I think the viewing conditions take some getting used to.
- Good to see other people's structure and thought patterns.
- Good to gain an insight into other reporting styles.
- I am uncomfortable at the thought of getting the answers wrong, but it is useful to see other people's opinions and report writing styles.

Appendix 1 – Questionnaire for the Pilot evaluation of the Usability of the "GI Reporting Case Studies" section of the Blackboard VLE

Section 1 : About you

1. What is your age? *21-30* *31-40* *41-50* *51-60*

2. What is your gender? *Male* *Female*

3. Do you own a home computer? *Yes* *No*

4. If yes to Q3, do you have access to Broadband internet connection? *Yes* *No*

5. Do you have access to a computer at work to assist with your studies? *Yes* *No*

6. Does your work computer have access to the internet? *Yes* *No*

7. Does your work computer have access to email? *Yes* *No*

8. Please identify which of the following describes your IT / computer ability in these areas :

   a. Sending and receiving emails

      No experience *Some experience* *Proficient* *Expert*

   b. Searching the internet

      No experience *Some experience* *Proficient* *Expert*

   c. Creating documents in Microsoft Word

      No experience *Some experience* *Proficient* *Expert*

   d. Using Excel

      No experience *Some experience* *Proficient* *Expert*

   e. Using the Blackboard Virtual Learning Environment

      No experience *Some experience* *Proficient* *Expert*

   f. Using online discussion forums or bulletin boards

      No experience *Some experience* *Proficient* *Expert*

Section 2 : Evaluation of the Software

9. Following your tutor introduction to using this software, how soon did you feel confident to use it unaided ?

   After 1 case *After 2 cases* *After more than 2 cases*

10. How simple did you find navigating around the system?

    Difficult *Not too difficult* *Quite Easy* *Easy*

11. Did you make any mistakes (such as pressing the wrong keys?)

    Yes *No*

12. If yes, what sort of mistakes did you make?

13. If you made a mistake, was it easy to rectify it and get back to where you wanted to be?

    Yes *No*

14. Did you find the layout of the images appropriate (thumbnails down the side, and a single large image on screen)?

    Yes *No*

15. Did you find the layout of the cases was consistent (one case was laid out similar to the next)?

    Yes *No*

16. Were the thumbnail images in each case laid out in an appropriate order to mimic clinical practice(eg. starting with rectum and sigmoid first).

    Yes *No* If no, please comment further.

17. Were the images of an acceptable quality on which to practice pattern recognition and image interpretation ? Please comment on :

Image contrast	*Not acceptable*	*Acceptable*
Resolution	*Not acceptable*	*Acceptable*
Physical size	*Not acceptable*	*Acceptable*

Please add comments if appropriate :

18. Was there sufficient clinical information to make a judgement on the images?

    Yes *No*

19. How did you view the level of difficulty of the cases presented?

    Very Difficult *Quite Difficult* *Straight-forward*

20. How did you view the level of difficulty of writing reports in the Discussion Board?

    Very Difficult *Quite Difficult* *Straight-forward*

21. Did you find moving between the discussion board and the cases easy?

    Yes *No*

Section 3 : Evaluation of the Learning Experience

22. Do you feel uncomfortable allowing your reports to be viewed by your peers?

    Very uncomfortable *A little uncomfortable* *Not worried*

23. If you were feeling uncomfortable with sharing your reports, do you think that you would become used to this over time?

    Yes *No*

24. Did you find it useful being able to view other students' reports?

    Yes *No* Please expand on your answer

25. Did you find the facilitator's (tutor) comments useful?

    Yes *No*

26. Would you be interested in continuing these reporting exercises off campus (between academic blocks of study)?

    Yes *No*

27. If yes, how much time / notice would you need to complete 4 cases :

    1 week *2 weeks* *3 weeks*

28. Where would you complete the cases?

    At home *At work* *Either*

Please make any additional comments here :

Thank you for taking the time to complete this questionnaire.