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# User interface evaluation of a multimedia CD-ROM for teaching minor skin surgery

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Expert operative information is a prerequisite for any form of surgical training. However, the shortening of working hours has reduced surgical training time and learning opportunities. As a potential solution to this problem, multimedia programs have been designed to provide computer-based assistance to surgical trainees outside of the operating theatre. Few studies, however, have focused on the interface features of surgical multimedia programs, the successful design of which could be conducive to the evaluation of the effectiveness of learning. This study evaluated a multimedia CD-ROM designed for teaching minor skin surgery. A questionnaire, based on an existing user interface rating tool, was administered to 20 trainees (both junior and senior) in plastic surgery. Findings from the study revealed trainees' high rating of the CD-ROM on a scale of 1–10 (mean = 8); the analysis of which contributes towards an understanding of both the characteristics of the learning material and the learners in the evaluation of the user interface.

**Keywords:** surgical skills; evaluation; interface design; e-learning; CD-ROM

## 1. Introduction

Expert operative information is a prerequisite for any form of surgical teaching, competency assessment or error detection. Surgical trainees acquire expert operative information through on-the-job training, although trainees have seen their operating exposure decline, particularly following the new European Work Time Directive, which has considerably shortened their working hours (Chikwe *et al*. 2004). These changes have affected all medical specialities, but for most part surgical fields, such as plastic surgery and including minor skin surgery (Grunwald *et al*. 2004), which is due to the long training period needed to attain the high level of skill acquisition involved (Kneebone and ApSimon 2001). Consequently, new methods of training surgeons outside the operating theatre have emerged. Currently, most support materials for training in minor skin surgery are in the form of a printed medium (i.e. textbooks), which lack detail and interactivity (Edwards 2001). The shortcomings of conventional methods of surgical training (i.e. textbook, classroom and operating theatre) in the current climate of surgical apprenticeships have led to the development of computer-based programs, such as multimedia applications in medical education (Ruiz *et al*. 2006).

Multimedia combines different media such as text, graphics, animation, pictures, audio and video to communicate information to learners. The presentation of information in this format has been found to aid learning, for example, in terms of the retention of information (i.e. the recall of facts and steps in a process). Extensive investigation by Mayer (2001), for example, demonstrated that, when text and graphics are combined, information retention increases by an average of 42%. Notwithstanding the importance of the educational value of such programs, some research suggests that a focus on the technical aspects, i.e. the usability, of these applications and specifically the design of the user interface, is conducive to the users' goal of learning. A poorly designed interface could in fact affect the educational effectiveness of a program (Mehrabi *et al*. 2000); however, clear guidelines on the design of user interfaces for learning are lacking (Reeves *et al*. 2004). The purpose of the present study is to evaluate the user interface of a multimedia CD-ROM for teaching minor skin surgery. The next section critically discusses the role of multimedia in the context of surgical training and current evaluation practice.

## 2. Multimedia programs for surgical training

Trainee surgeons require extensive training to reach an expert level of competence. The advancement of

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surgical techniques coupled with the reduction in opportunities to acquire surgical knowledge, skills and experience in the operating theatre, ward and clinic has prompted the need for alternative teaching methods for trainees to learn and practise new skills. Research has shown that computer-based surgical training is appropriate for acquiring medical knowledge on visually intensive, detail-oriented subjects such as human anatomy and operative skills for dissecting, suturing and the handling of instruments (e.g. Torkington *et al*. 2002). Kneebone and ApSimon (2001) state that multimedia can present the key components of surgical skills by progressing logically from explanation (using animation) to clinical demonstration (using video) to technical demonstration (on a model). Several multimedia applications for surgical training have been designed and developed (Jha *et al*. 2002), which aim to provide, in addition to an effective learning material, a 'cognitively efficient interface design to capitalise on the advantage of presenting information in multiple modalities' (Grunwald and Corsbie-Massay 2006). However, Martelli *et al*. (2003) have observed that the literature contains few evaluations of the user interface of multimedia for surgical training, an issue which is discussed in more detail next.

### 2.1. *User interface evaluation*

Educational multimedia programs present challenges to both users and designers. For users, the learning process is made doubly difficult in terms of dealing both with the learning material as well as the technology itself (Parlangeli *et al*. 1999). Users have to assimilate a large amount of new information, whilst simultaneously learning to interact with the educational program. For designers, the aim is to reduce the cognitive load on the user as Ring (1996), for example, has observed that the smaller the cognitive demands made by the interface, the greater the cognitive effort that the learner can direct to the content, and the shorter the learning curve before the interface becomes essentially 'invisible' to the learner. Minimising cognitive load is especially relevant to educational products intended for medical students. Information-intensive subjects, such as the human anatomy, can impose a heavy, intrinsic cognitive load onto students given the complexity of the subject matter (Khalil *et al*. 2005). The use of an educational multimedia program can impose a germane cognitive load, as users try to deal with the interface and its presentation of the learning material (Grunwald and Corsbie-Massay 2006). Thus, it follows that if a program is difficult to use, then the educational effectiveness of a product could be called into question, as users will not be able to process the content information (Tselios *et al*. 2001).

Therefore, addressing interface design issues prior to evaluating the educational benefits of multimedia may lead to more fruitful assessments of learning (Kim *et al*. 2001). Hunt *et al*. (2004) conceptualise three broad orientations to evaluating educational multimedia: product orientation (focus on the multimedia only), product and process orientation (focus on both the multimedia and the learning it supports), and process orientation (focus on the learning only and including aspects of personalisation). In the context of medical and science education, for example, some researchers have focused on usability, which can be said to approximate to a 'product and process' orientation (Kim *et al*. 2001, Crowther *et al*. 2004). Usability consists of three evaluation dimensions: effectiveness (relating to the users' ability to carry out a task), efficiency (relating to the time taken for users to carry out a task), and satisfaction (relating to users' satisfaction with the way in which they use the system) (International Organisation for Standardisation 1998). In the present study, the evaluation focuses on the end-users' (e.g. surgical trainees), rather than experts' (e.g. designers) evaluations of the multimedia, and therefore broadly relates to the satisfaction that users experience with the user interface. Moreover, the complexity of the learning process and the benefit of involving users with domain knowledge in which the product is used means that an assessment of how satisfied users are is important in understanding the user needs of educational multimedia. A rating scale in a questionnaire is a typical measurement tool, and an average value taken from a number of single users can indicate an objective value of satisfaction with the user interface (Granic *et al*. 2004). The multimedia program, participants and evaluation tool are described next.

## 3. Materials and methods

### 3.1. *Multimedia course in minor surgery CD-ROM*

The CD-ROM titled "Multimedia Course in Minor Surgery" (Alvarez Parra *et al*. 2001) is approved educational material for The Royal College of Surgeons of England STEP course. It was developed by a team of experts in plastic surgery, pathology, anaesthesia and general practice to provide knowledge and guidance on the diagnosis and treatment of common skin lesions with the aid of over 400 photos and illustrations and over 30 video clips. The CD-ROM comprises five sections, which can be described as follows:

(1) *Skin lesions*: Provides a comprehensive review of common skin lesions explaining the diagnostic characteristics, natural history and treatment of each lesion. The section contains many

illustrative photographs that complement the text. Figure 1 shows a screenshot from the skin lesions section and displays the interface design of the CD-ROM.

(2) *Pathology*: Details pathological descriptions with microscopic slides (by clicking on a microscope icon). The pathology section is closely linked to the skin lesions section (see the 'pathology' button, bottom right, in Figure 1). Conversely, in the pathology section the button reads 'skin lesions' which when clicked navigates to the relevant screen in that section.

(3) *Anaesthesia*: Describes the mode of action, techniques and precautions for the use of local anaesthetic agents. This section is illustrated with anatomical drawings and photographs. Figure 2 shows a screenshot illustrating a specific technique in this section.

(4) *Surgery*: Discusses every stage of minor surgery treatment, from preoperative assessment of patients, descriptions of the instruments (and illustrations on their handling), a history of suture materials and descriptions of post-operative care. Practical advice is given on surgical procedures and illustrated with photos, drawings and video clips. Figure 3 shows a screenshot of a video clip in this section.

(5) *Setting up practice*: Explains the requirements to set up a minor surgery service in a general practice, with illustrative pictures of an operating theatre, necessary equipment and instruments. It also gives information on the application forms needed for approval.

Lastly, in the CD-ROM there is an Appendix and a World Wide Web link. The former contains several sub-sections such as a tutorial and video index and the latter links to the GMED Ltd. website, publishers of the CD-ROM.

### 3.2. *Participants*

Twenty trainees from three different plastic surgery units in the South of England were recruited to participate in the study, which constitutes a small sample size, but is in line with study samples in similar usability evaluation studies (Kim *et al*. 2001). Trainees consisted of two grades: 13 senior house officers (SHO) and 7 specialist registrars (SpR). SHOs are junior trainees who have a range of clinical experience from 1 year post-qualification. SpRs are senior trainees who are undertaking committed surgical training within their specialty. Competition for registrar posts is fierce and the number of doctors and time spent at the SHO grade are increasing, whilst training opportunities are decreasing (Hazarika 2005). Consequently, the availability of effective training materials to fill the gap between SHO and SpR grades is of importance. For SpRs, who have more surgical training and experience than SHOs, the concern here is on the continuation of medical education to update and maintain clinical standards of practice (Young *et al*. 2006).

Trainees in plastic surgery were chosen because plastic surgeons perform most minor skin surgery in England (although the CD-ROM will be useful for general practitioners, for example, who might be interested in performing minor skin surgery in their practice). All the trainees had computer experience, using a

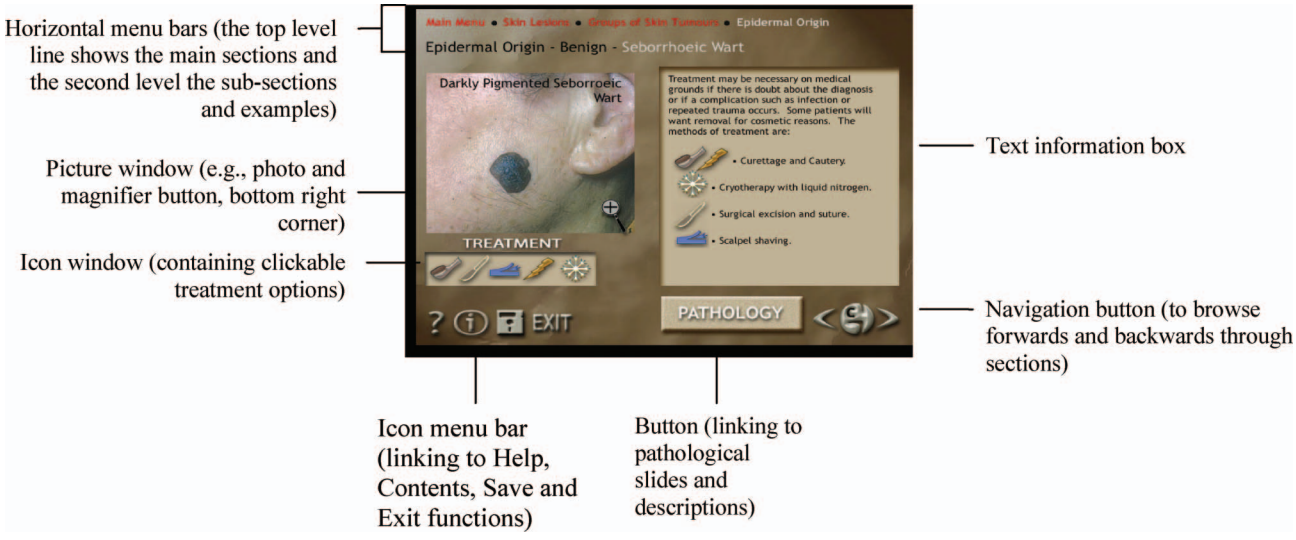


Figure 1. Interface design of "Multimedia Course in Minor Surgery" CD-ROM (screenshot from the Skin Lesions section).


Figure 2. Illustration of an anaesthesia technique.

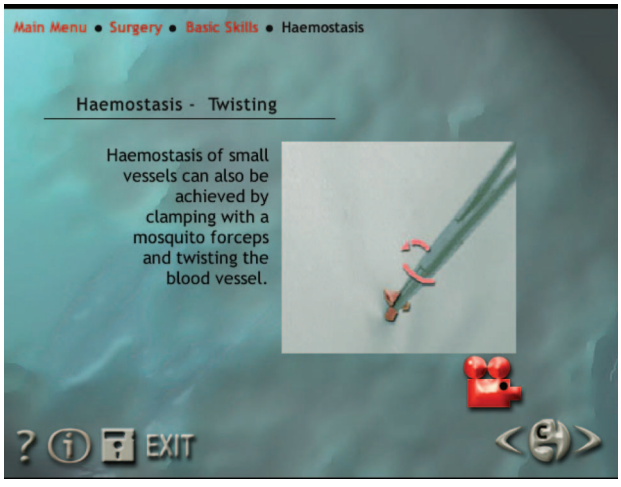


Figure 3. Still from a video clip (film activated by clicking on the projector icon).

computer regularly for work, education or leisure purposes. Eleven trainees (55%) had used a multimedia CD-ROM for surgical training previously; one trainee (5%) had used the CD-ROM under study before; and three trainees (15%) had used an alternative minor skin surgery course CD-ROM previously. The trainees watched a short presentation and were requested to use the CD-ROM for at least 45 min so that they might be able to view all the contents of the CD-ROM. Each trainee then received a copy of the CD-ROM and a questionnaire. Trainees were reminded that they were testing the user interface and not their knowledge.

### 3.3. *The user interface questionnaire*

The questionnaire administered to the trainees to complete their evaluation of the CD-ROM (see Appendix) was based on an existing multimedia user interface evaluation tool by Reeves and Harmon (1993, 1994). The tool provides a set of evaluation criteria that direct designers to areas that may have been overlooked during product development. An evaluation using the tool is relatively quick and easy to perform, and has been used in other evaluation studies on the design of instructional interfaces (Cartwright 2004). The original evaluation tool comprised of 10 user interface dimensions: ease of use (user interaction with the program), navigation (user orientation), cognitive load (mental demands imposed by the interface), mapping (users' path through the program), screen design (layout and media elements such as text, colour etc.), knowledge space compatibility (relevance of the content), information presentation (clarity of the content), media integration (combination of media elements), aesthetics (pleasantness of the interface) and overall functionality (utility of the program). Each of the user interface dimensions, for instance 'ease of use', were rated both along a continuum (e.g. difficult–easy) and along a 1–10 point Likert scale (with 1 being highly negative and 10 being highly positive). A comment box for each dimension was also included so that the trainees could write comments to explain their ratings.

The tool was adapted in this study, as it was originally devised for use by experts (e.g. software designers) rather than end-users of a product (e.g. surgical trainees). To make it relevant to the testing group under study, the tool was adapted in primarily five ways:

(1) The tool was transformed into a questionnaire format in order to gather additional data such as background detail on the participants and some post-evaluation information. Thus, the new user interface evaluation questionnaire was divided into three sections: (A) Background information; (B) User interface design features; and (C) Post-evaluation.
(2) The user interface dimensions were renamed user interface features, in order to scale down and fix in the trainees' mind the 10 most prominent aspects under evaluation.
(3) The presentation of the interface features was changed to reflect an ordering that flowed more intuitively. This change affected user interface dimensions numbered 6 (knowledge space compatibility), 7 (information presentation) and 8 (media integration) in the original tool. In the updated version, they were rearranged in the order of: 6 (media integration), 7 (knowledge space compatibility) and 8 (information presentation). This was done primarily so that

user interface feature 6 (media integration) would follow more naturally from user interface feature 5 (screen design), which meant that the original user features 6 and 7 were kept in the same order but renumbered user interface features 7 and 8.

(4) Three of the original user interface dimension continuum labels were changed to make them more meaningful: Mapping continuum labels were changed from none – powerful to difficult – easy; screen design continuum labels were changed from violates principles – follows principles to poorly designed – well designed; and information presentation continuum labels were changed from obtuse – clear to unclear – clear.

(5) Short definitions were provided for each of the user interface features and turned into questions, as opposed to supplying a supplementary explanation of each feature.

The results from the evaluation questionnaire are described next.

## 4. Results

Given the small study sample, descriptive statistics are provided to convey the general opinion of the trainees on the CD-ROM, who averaged 69 min (range 45–120) in using the CD-ROM to complete the evaluation questionnaire. Figure 4 shows the average ratings for the CD-ROM across interface features and for grade of surgical trainee (SHO and SpR).

As can be seen from Figure 4, some marked differences in the rating of the interface features can be observed between the SHO and SpR grades and also within the SHO grade itself (divided into training groups for those with less than 3 years and those with 3–5 years training). Within the SHO grade, all the trainees with less than 3 years of training rated all the interface features more highly than SHOs with more than 3 years of training, with the exception of the feature of cognitive load. Between the SHO (including both training groups) and the SpR grade, there were also clear differences in the ratings. For the SHO grade (including both training groups) the following six interface features were rated more highly than the SpR grade: ease of use, navigation, screen design, knowledge space compatibility, aesthetics and overall functionality. For trainees at the SpR grade, the following four features were rated more highly: cognitive load, mapping, media integration and information presentation. While the differences between the training groups and grades may be slight (e.g. ratings for screen design), which a larger sample size could have distinguished more easily, there does appear to be a pattern emerging in the rating of interface features that the level of knowledge and experience in the trainee seems to influence. The next section presents the findings from each user interface feature in more detail.

### 4.1. *User evaluation of the interface features*

The findings from the evaluation are summarised in Table 1. Owing to the descriptive nature of the analysis, supporting comments are supplied from the trainees (by training group) to explain their ratings of each of the 10 interface features.

At the end of the questionnaire (in the post-evaluation section), trainees were asked if they would use the CD-ROM for future learning. Fifteen trainees (75%) said 'yes': they would use it. The remainder who

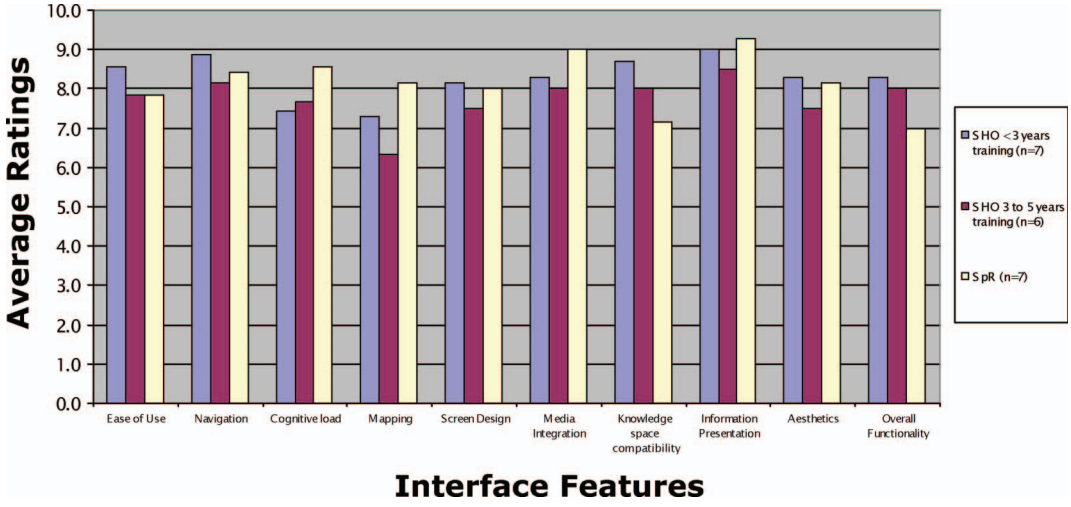


Figure 4. Average ratings of the interface features by grade of surgical trainee.

Table 1. SHOs and SpRs average ratings of the CD-ROM's user interface features.

| Interface feature | Average rating | Representative trainee comment (per rating) | | |
|---|---|---|---|---|
| | | SHO (<3 years training) | SHO (3–5 years training) | SpR |
| Ease of use | 8.1 | 'very easy to use, instructions are clear and in a logical format' (rating = 10) | 'was about to give 9, but it crashed' (rating = 5) | 'intro windows video is small' (Rating = 10) |
| Navigation | 8.5 | 'tendency to jump a slide. Later crashed' (rating = 6) | 'easy menus, good selection' (rating = 8) | 'very intuitive' (rating = 9) |
| Cognitive load | 7.9 | 'logical progressions – good teaching and modalities' (rating = 10) | No comment | 'yes, less so with the skin lesion section when there could have been more orientation by section' (rating = 8) |
| Mapping | 7.3 | 'yes, it was easy because I could remember what subsection I clicked, but it was helpful to have the menu (the section you were in) on each page at the top as a reminder' (rating = 9) | No comment | 'seemed to be several routes to get to a similar place' (rating = 7) |
| Screen design | 7.9 | 'occasionally there is lots of written text. I usually only remember a few points. Information is easier to digest if it's in short points/lists' (rating = 8) | 'easy to look at. Nice textures and scrolling' (rating = 8) | 'only uses a small portion of screen - why?' (rating = 8) |
| Media integration | 8.5 | 'very well co-ordinated and relevant' (rating = 9) | No comment | '... much better than other packages' (rating = 8) |
| Knowledge space compatibility | 8 | '... the clips on curettage and practical procedures were very helpful' (rating = 10) | No comment | 'very good for the basic surgery trainee – but not good for the advanced trainee as too simple. Also, some useful things missed out e.g., how to calculate toxic dose of LA from formulations used' (rating = 2) |
| Information presentation | 9 | 'presented well in a way students/ non-specialists can understand' (rating = 10) | 'very useful' (rating = 10) | No comment |
| Aesthetics | 8 | 'the aesthetic was well presented' (rating = 8) | 'title clumsy. Minor surgery – A multimedia course would sound better' (rating = 7) | 'a little dark. Brighter would be better' (rating = 8) |
| Overall functionality | 7.8 | 'provided an excellent source of information instead of having to seek help from someone' (rating = 9) | No comment | 'would be good for more junior trainees. Wish we had this 10 years ago' (rating = 5) |

SHO, senior house officer; SpR, specialist registrar.

said 'no' commented that they would not use the CD as it was too basic for them, but one trainee said that he would use a similar CD-ROM if it was on more of an advanced level. All 20 trainees said 'yes': they would recommend the CD-ROM to their colleagues; and that they thought that multimedia for surgical training complements conventional teaching. All 20 trainees said 'yes': they thought their knowledge in minor skin surgery skills had improved following the use of the CD-ROM. For example, one trainee commented that you can 'learn a bit about the pathology of a few types of skin lesion'. The trainees' average rating for their perceived improvement in knowledge was 6 (on a scale of 1–10); although any improvements in learning are subjective judgements and are not formally assessed in this study.

## 5. Discussion

The responses from the evaluation questionnaire indicated highly positive ratings of the user interface of the CD-ROM, with an overall mean rating of 8 (on a scale of 1–10). In the analysis of our findings, we structure our discussion around the characteristics of

(a) the learning material; and (b) the learners, following Najjar (1998), who identified these factors as key to the design of educational multimedia interfaces. The last part in this section identifies the limitations in the study and makes some suggestions for future research.

### 5.1. Characteristics of the learning material

The highly positive ratings of the CD-ROM demonstrate that the trainees felt that the multimedia format was a medium that satisfactorily communicated the information to them. Indeed, the top ranking interface design feature was information presentation (average rating = 9) and joint second in ranking was navigation and media integration (average rating = 8.5). Therefore, the design of the CD-ROM was such that it allowed for a clear presentation of the content that was easy to locate, access and orient to, with a combination of media that was effective for delivering the actual content. The design attributes of the CD-ROM which may have facilitated this could have been the clear use of menu bars and buttons to link to relevant sections (e.g. pathology) and the use of photos to illustrate different lesions that trainees can later recognise and recall.

Ease of use was the third ranking interface design feature (average rating = 8.1). This is a high rating, but some of the more negative comments on this feature were actually related to screen design and the use of media elements such as text and the font size. This suggests that in the evaluation of this feature, trainees were making associations between screen design and ease of use, which is of interest as it points to the multi-dimensional nature of this feature (as a single and aggregate measure), and this belies a complexity that requires further investigation, beyond the scope of the present study, in the context of surgical training and the use of multimedia.

Knowledge space compatibility and aesthetics were jointly ranked fourth (average rating = 8). A clear difference was made for knowledge space compatibility between SHOs and SpRs. The SHOs felt that the content was relevant to them as they were at a basic level, but for the SpRs the content was not advanced enough. This finding reflects the importance of targeting the product to the audience appropriately so that the users will be satisfied that their needs for learning have been met. With regard to aesthetics the trainees, while positive, made some negative comments, again reflective of screen design issues such as font size and the use of colour, where light (and small) fonts on a dark background were used consistently in screens throughout the program, which was to the detriment of users.

Cognitive load and screen design were jointly ranked fifth (average rating = 7.9). As explained previously, cognitive load is a key issue in the design of educational multimedia products. Whilst the rating of cognitive load is still relatively high, one of the trainee's comment regarding the level of orientation by section in the skin lesions section, (a major section on the CD-ROM) suggests that the volume of information was perhaps overwhelming, and may have in fact overloaded this trainee and others. This is unsurprising given the many different types of skin lesion, which were distinguished in the CD-ROM by different categories and sub-categories. A design suggestion might be to break up the volume of information with a short quiz after each part on the section on skin lesions. This would help the users to ease the load on memory, focus their attention and possibly increase their motivation for learning when interacting with these sections. The screen design interface feature is very important as different attributes of screen design, such as colour and text, were raised during the evaluation of other design features (e.g. ease of use). It is a feature that needs to be well-designed so that it can help to present information that is stimulating for the user. In the design of the CD-ROM, the colours were dark, the readability was sometimes poor and the amount of text could be excessive. All of this serves to distract the user from the content material and they could miss the relevant information. Generally, the screen design of the CD-ROM was perceived as attractive and so some rules on consistency need to be applied in the design to make all the screens uniform in their appearance.

Overall functionality was the sixth ranking feature (average rating = 7.8). This feature appeared to be rated on the same basis as the knowledge space compatibility feature, as the comments made reflected the difference between SHOs and SpRs in terms of their requirements of the learning material. That is to say the SpRs rated the CD-ROM highly for junior surgical trainees, but the design failed to attract the more senior trainees (see the next section for further explanation of this issue).

Mapping was the seventh and last ranking feature (average rating = 7.3). The design attributes of the CD-ROM cited as conducive to good mapping were the use of menu bars, which provided orientation at all times and different options to return to the screen last visited (i.e. the use of the navigation button in the bottom right hand of the screen). This allowed the users to be flexible in their approach to using the CD-ROM and it also has an impact upon two other design features of navigation (e.g. the menu bar style of navigation) and screen design (e.g. the positioning of the control options, icons, menu bars etc.). Generally,

it seemed that the trainees felt that they understood which parts of the CD-ROM they had visited and had yet to visit, which is important as it shows that they could conceptualise the information space they were being presented with and so did not experience much disorientation.

### 5.2. Characteristics of the learner

The participants in the study reflected a group of learners with diverse skills and knowledge, for example between the SHO and SpR grade of trainee. The differences in ratings between the groups gave some indication as to what naïve (e.g. SHO) and expert (e.g. SpR) surgical trainees may expect and require from their learning materials. Certainly, the more experienced trainees felt that the content was too basic for them. However, the SpR higher ratings (as compared to the SHO ratings) for cognitive load, mapping, media integration and information presentation features are encouraging towards determining the effectiveness of the CD-ROM as suitable learning material. These features collectively relate to the level of the content material and may not have been noted especially by SHOs as they may not be at a stage in their training to know which information is important and where they should focus their attention. However, the SHOs' generally high ratings of the CD-ROM reveal that they felt that their learning was being supported. However, future work (see also the next section for more directions) needs to judge whether such ratings by the SHOs are not due to the novelty of the multimedia format and will be sustained over time. With regards to SpRs, there still persists the training issue of the continuation of medical education with experienced surgeons (as raised previously). For this type of learner, the challenge lies in designing multimedia programs that can overcome the experts' familiarity with the content material by presenting the information in a way that is engaging and stimulating for more experienced learners in their ongoing practice of surgical knowledge and skills.

### 5.3. Limitations and suggestions for future research

The study being small and exploratory in nature, it is difficult to apply its findings to surgical trainees more generally. However, studies of surgical trainees are limited and so this work could form a valid starting point for investigations into learning and skill development in medical training. The user interface rating tool proved useful for the trainees' evaluation as it was quick and easy to complete, and provided some valuable feedback from the actual users of such applications, as to the interface design features that they were satisfied with. The user interface rating tool will require further testing in order to verify the key evaluation criteria in educational multimedia. Also, as the evaluation focused broadly on the usability of the CD-ROM, future work will need to address how usability relates to learning. This should be undertaken to explore in more depth some tentative findings from the study, which suggested that trainees felt that the use of the CD-ROM improved their knowledge. It could also contribute to the creation of learning materials that fully support characteristics of the learners and their interaction with the technology towards meeting their goals for training.

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## Appendix: User interface evaluation questionnaire

The user interface evaluation questionnaire of the 'Multimedia Course in Minor Surgery' CD-ROM is given below.

### *Part A: Background information*

Name:
Date of birth:
Qualifications:
Name and place of hospital where based:
E-mail:

Grade
SHO ☐ Year 1 2 3 4 5 6
SpR ☐ Year 1 2 3 4 5 6

Please tick one of the following options:

Do you use a computer regularly in the following areas (tick all that apply)?

Work ☐ Education ☐ Leisure ☐

How much time a day do you spend using a computer? .....
.....

Have you used a multimedia CD-ROM for surgical training before?

Yes ☐ No ☐

Have you used 'Multimedia Course in Minor Surgery' CD-ROM before?

Yes ☐ No ☐

Have you used any other CD-ROM for minor skin surgery before?

Yes ☐ No ☐

How much time did you spend on watching 'Multimedia Course in Minor Surgery' CD-ROM? .....

### *Part B: User interface design features*

Please rate 'Multimedia Course in Minor Surgery' CD-ROM on a scale of 1–10, by circling the appropriate number under each user interface design feature.

1. *Ease of use*

Is it easy for you to use and interact with the CD-ROM?

1 2 3 4 5 6 7 8 9 10

Difficult Easy

Any comments:

2. *Navigation*

Is it easy for you to move through the contents of CD-ROM, and did you know how to get to another part of the CD-ROM?

1 2 3 4 5 6 7 8 9 10

Difficult Easy

Any comments:

3. *Cognitive load*

Is it easy for you to deal with the different options available on the CD-ROM? For example can you remember the contents of the last screen while you moved onto the new screen?

1 2 3 4 5 6 7 8 9 10

Unmanageable Manageable

Any comments:

4. *Mapping*

Is it easy for you to keep track of where you in the program? For example, do you understand which section of the CD-ROM you have interacted, or not interacted with?

1 2 3 4 5 6 7 8 9 10

Difficult Easy

Any comments:

5. *Screen design*

How do you rate the use of different media in the CD-ROM? For example, the choice of size, colour etc., of the text, graphics, audio and video used?

1 2 3 4 5 6 7 8 9 10

Poorly designed Well-designed

Any comments

6. *Media integration*

Does the combination of text, graphics, audio, video used in this CD-ROM coordinate effectively?

1 2 3 4 5 6 7 8 9 10

Uncoordinated Coordinated

Any comments:

7. *Knowledge space compatibility*

Is the knowledge in the CD-ROM relevant to your current knowledge on minor skin surgery?

1 2 3 4 5 6 7 8 9 10

Incompatible Compatible

Any comments:

8. *Information presentation*

Is the knowledge presented in this CD-ROM on a level that you can understand?

1 2 3 4 5 6 7 8 9 10

Unclear Clear

Any comments:

9. *Aesthetics*

How would you rate the overall look and feel of this CD-ROM?

1 2 3 4 5 6 7 8 9 10

Displeasing Pleasing

Any comments:

10. *Overall functionality*

How would you rate the overall functionality of this CD-ROM in relation to your intended use of learning minor skin surgery skills?

1 2 3 4 5 6 7 8 9 10

Dysfunctional Highly functional

Any comments:

***Part C: Post-evaluation***

Please tick one of the options (yes/no) for the following.

Would you use this CD-ROM again for future learning?

Yes ☐ No ☐

If 'No', please explain in the box below:

Would you recommend this CD-ROM to your colleagues for training in minor skin surgery?

Yes ☐ No ☐

Do you think that multimedia complements conventional surgical training?

Yes ☐ No ☐

Do you think that the use of this CD-ROM has improved your knowledge in minor skin surgery skills?

Yes ☐ No ☐

If 'Yes', please circle the appropriate number on the scale below to indicate the level of improvement:

1 2 3 4 5 6 7 8 9 10

No improvement Major improvement

Any additional comments, or suggestions?