Delivering a Web-based Course for Cambridge Medics: Evaluation, Issues & Outcomes

Dawn Leeder & Tom Davies
University of Cambridge
dcl25@cam.ac.uk twd10@medschl.cam.ac.uk

Abstract

In the autumn of 2000, a course in Medical Sociology at the University of Cambridge, consisting of 10 hour-long lectures, ceased in the traditional sense, and was reborn, entirely online. "Interactive Medical Sociology" is a series of innovative and interactive multimedia modules using images, texts, video clips, graphs, charts, animations and a narration. This year's cohort of Cambridge medics have just completed and evaluated the course for the first time. Their feedback will inform the second generation of the course. This paper discusses some of the development issues, looks at student responses and outlines the future refinements planned as a result of these evaluations.

1. Introduction

In the mid-1990s the department of Public Health and Primary care in Cambridge University was faced with several teaching problems. These included a number of requests to give lectures on medical sociology to a few small and separate groups, the prospect of very small numbers on the post graduate course (the Diploma of Public Health) and the reorganisation of the undergraduate course. This would involve the students being taught in many small groups.

We realised that the solution to these problems was to develop a computer based course accessible to all these groups, which would also give us an opportunity to develop first class material with the added value of this type of course.

Funding was obtained from the post graduate training budget, and for the past 2 years the traditional course based on about ten lectures (the number varied with the audience) has been transformed into a series of online interactive modules. The lectures no longer exist in the real world; only virtually. Students now have the freedom to work through the material at times that they choose and at their own pace, but this new found freedom is not universally seen as an advantage.

The first cohort of Cambridge undergraduate medics have just completed the online course and have submitted their evaluations. Their criticisms and the issues they have raised will inform and serve to improve the next generation of the course.

2. How the online course was developed and why

Our first priority was to replace the existing lectures. We wanted to try to retain a 'lecture-like' experience, hence a narration was used. The first step was the production of a script to provide the basis for each module, and the expert who wrote it indicated what images, graphs or other information he or she would like to appear on the screen. The lecture series had been running for twenty years; this was an excellent opportunity to bring graphs and statistical information up to date. Multimedia is an image rich environment and many high quality images were sourced to complement the narrative content. Special video footage was filmed and edited and animations were also used. All the various media resources were brought together and authored in Macromedia Director, the industry standard software package for creating interactive multimedia.

Secondly, the lectures should be enhanced and the experience improved to add interest. The level of interactivity was a key issue. Heppell (1993) makes the distinction between the narrative and the interactive function [1]. Summarised as ‘stop’, ‘start’, ‘watch’and ‘listen’, the narrative mode produces predominantly passive roles. The interactive function is typically much more user-oriented. It is characterised by terms like ‘browse’, ‘investigate’, ‘explore’, ‘choose’ and ‘do’. Responsibility is shifted towards the user.

Multimedia can operate in both the narrative and interactive modes. Too much emphasis on the narrative mode can see the learner 'switching off' (as often happens in less interesting lectures), but conversely when there is too much interactivity the learner can become lost, confused and disoriented. Heppell also emphasises the importance of the narrative function for didactic purposes; a balance must obviously be struck between these modes for opti-

mum engagement coupled with understanding. We adopted a 'semi-linear' approach. Linear sections are required where an argument needs to be made in stages and in a particular order to be followed. However, where there are a number of branching menu items, the learner can choose their own order of which branch to tackle.

The delivery system was the third issue to be decided. Macromedia Director files can be "Shocked", that is, converted into Shockwave files which will play in a web browser with the requisite plug-in. The web was fast becoming ubiquitous and the web browser a universal interface [2]. Most students are familiar with the web-browser and its behaviours [3]. This reduces the cognitive load that would be imposed if an entirely new and unfamiliar interface were offered to them. The web also has other advantages. By keeping the entire course on one central server, version control causes no problems (as it does when delivering on CD-ROM). Bandwidth (or lack of it) can be a problem but this project had the benefit of the fast Cambridge University Data Network (CUDN) which enabled speedy delivery of rich image, audio and video content. Students were not expected to access the course at home or over a modem. Like lectures, the course was to be followed during term-time.

Cambridge is a distributed university and first year medical students can be resident in any one of 35 colleges. All colleges were informed of the technical requirements for their computers to be able to deliver the modules at least a year before the course was due to go online. Most willingly complied; some did not and this seriously disadvantaged their students. The most common problem was that certain college computers had no sound cards, but there were other problems reported such as the college computer officer failing to perform the necessary plug-in installations (and refusing the students the access privileges to perform the installations themselves).

Navigation and orientation were key issues [4] and we spent a great deal of development time ensuring that students knew were they were and didn't get lost. The very positive feedback we received on human-computer interaction issues justified the amount of attention paid to this vital area.

3. Evaluation questions

Evaluation responses were submitted online using a web-based form that created database records. The questions covered technical issues, content, human-computer interaction and students' learning preferences. The questions (and average results in italic) were as follows:

1.0 Getting started (Y/N responses)
1.1 Did the modules load up correctly (Shockwave plug-in installed)?
1.2 Could you hear the narration?
1.3 Did the QuickTime videos load up and play?
1.4 Were the download times ("the world-wide wait") acceptable?

2.0 Content (Score 1-5)
2.1 Did you feel the level of difficulty was appropriate? Was it pitched at the right level for you? (1 = "inappropriate", 5 = "appropriate") *3.61*
2.2 Do you think this course has aided your understanding of the subject? (1 = "not at all", 5 = "very much") *3.63*
2.3 Do you think it will help you retain the information? (1 = "not at all", 5 = "very much") *3.16*

3.0 Human/computer interaction (Score 1-5)
3.1 How easy did you find the modules to use? (1 = "difficult", 5 = "easy") *4.32*
3.2 How readily could you navigate through each module? Did you know where you were and feel in control? (1 = "lost and confused", 5 = "oriented and in control") *4.36*
3.3 How well did you feel the various media (video, animations, graphics etc) were integrated? Were they combined to produce an effective whole? (1 = "poorly integrated", 5 = "well integrated") *3.83*
3.4 How do you rate the modules aesthetically? Did you like the look and feel of them? (1 = "displeasing", 5 = "pleasing") *4.15*

4.0 Preferences (Score 1-5)
4.1 Would you have preferred on-screen text to the narration? (1 = "prefer text", 5 = "prefer narration") *3.08*
4.2 How do you rate the modules against a traditional lecture? (1 = "prefer lecture", 5 = "prefer modules") *3.30*

4. Student responses

108 responses were received from a total of 270 students. Section 1.0 dealt entirely with technical issues. 20 respondents reported they were unable to load Shockwave and yet only one of these was unable to access the modules; all the others found a workaround such as using central computers outside of their college or a friend's private computer. 9 complained of not being able to hear the narration, but still managed to complete and assess the modules. QuickTime videos did not play satisfactorily for 52 of the respondents and this issue will require closer examination for next year's cohort as this means nearly half of the students couldn't access the videos and this is an unacceptably high figure. Because this problem had been identified early in the development by cross-platform testing, the videos were also provided as separate files embedded in a web page so that students who could not access the ones in the multimedia modules would at least be able to view them separately and therefore would not be discrim-

inated against. None of the students mention whether they could view these videos, however. 15 respondents said that the download time was unacceptable.

The rest of the questions covered content, human/computer interaction and personal learning preferences. Average scores obtained for each question are shown in Fig. 1. Highest scoring were the responses to human-computer interaction questions. The students seemed to find the online course very easy to use and navigate and they also found the media well integrated and aesthetically pleasing. We found these results encouraging.

It then became clear that there were two modes. Comparing 'help you to retain information' with 'prefer lecture or prefer modules' (Fig. 3) there was a group who felt that the online course did not help with retention and they preferred a lecture to the modules. The other large group of students both preferred the modules and felt that it helped them retain information. Comparing those who preferred text or narration with the preference for lectures or modules (Fig. 4) the same two groups separated with a sizeable minority preferring text and traditional lectures. This is strange because a traditional lecture would give

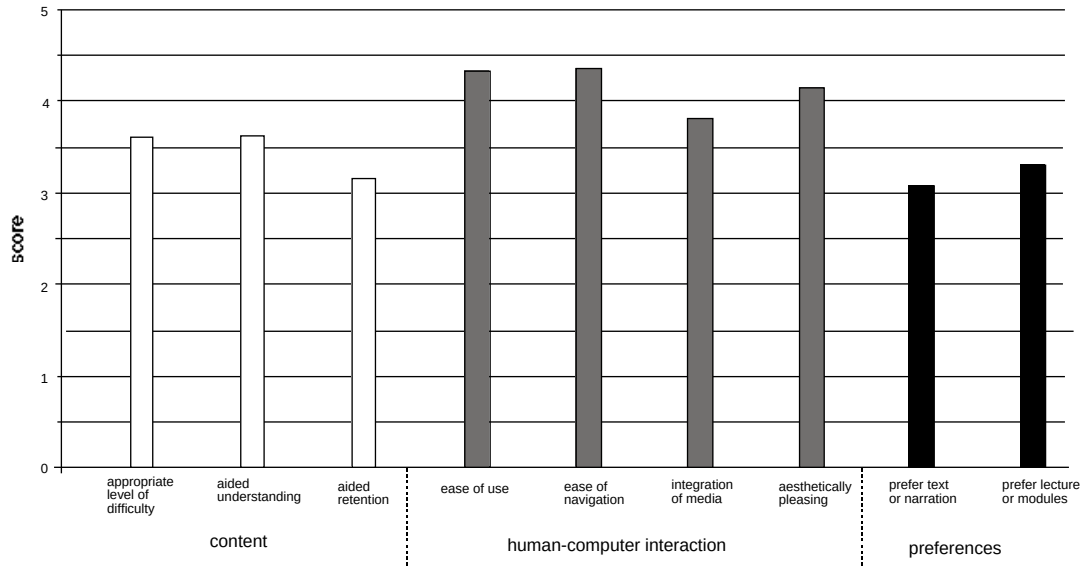

Figure 1. Average scores in response to evaluation questions

5. A closer look at some responses

Broadly, in the content section, they found the level of difficulty appropriate and that the course aided their understanding of the subject. However, the response to how well it aided retention came out close to a neutral score. Respondents also seemed ambivalent over whether they would prefer on-screen text to the narration and traditional lectures to the online modules. Consequently, we decided to look more closely at the distributions of the scores which are shown in Fig. 2a – i. The response to the question on whether they preferred on-screen text to the narration (Fig. 2h) had a strange distribution there being no central tendency.

The issues were clarified when the scores on retention and preferences were linked for each respondent and then entered into a 3 x 3 matrix. (Strictly speaking it would have been more accurate and valid to produce a 5 x 5 but reducing the size of the matrix made it easier to understand the figures).

less text than the modules. However, we suspect that the 'traditional group' would have been more comfortable with being told to memorise a book.

6. Respondents' comments

There was also a free text area of indeterminate length for respondents' comments. 75 out of the 108 respondents made comments about the course. Obviously some students made more than one comment giving a total of 107 comments. The comments were broadly grouped into the following categories:

Technical difficulties
Preferred on-screen text
Preferred traditional lecture
Pause button slow to respond
Pace of narration too fast
Print quality of lecture notes could be improved

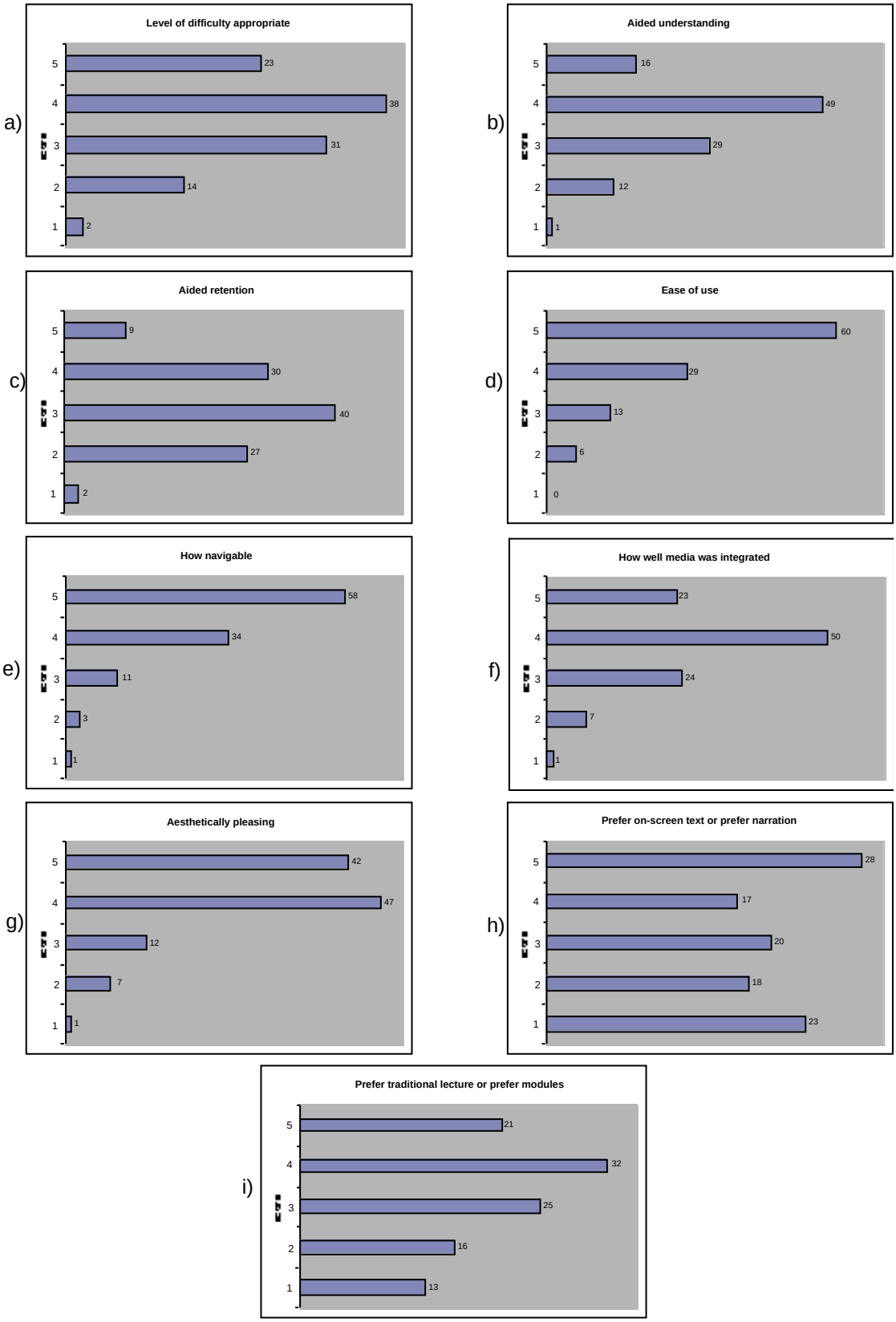

Figure 2. Distributions of scores in response to evaluation questions

Wanted structured timetabling
Wanted specimen exam/ self-test questions

We noted whether the respondents were generally positive or negative about the course. Those that would not fit into either category were deemed neutral. There were 34 positive comments, 57 negative ones and 16 neutral. These positive, negative and neutral comments were then plotted by category of comment. This made it easier to see where the problem areas lay (Fig. 5).

Technical difficulties were obviously the biggest issue - and unfortunately the one area that we had the least control or influence over as the colleges are autonomous. The main problem was the fact that several colleges do not have sound cards in their computers making it impossible

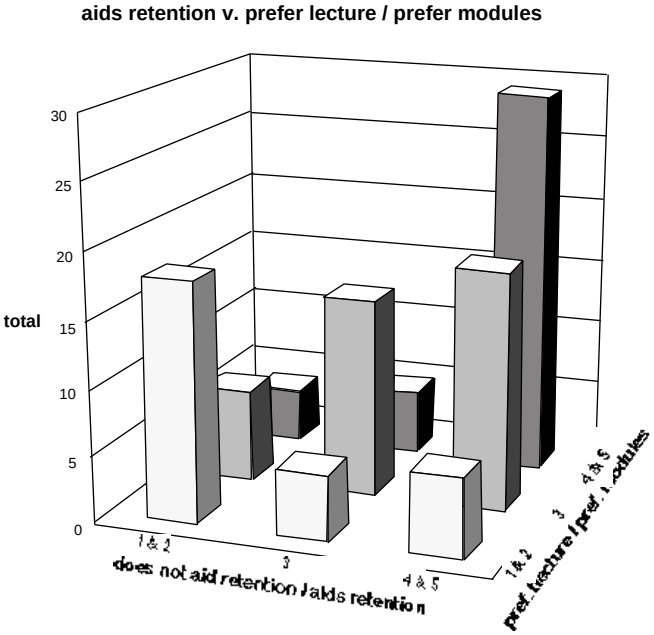

Figure 3.

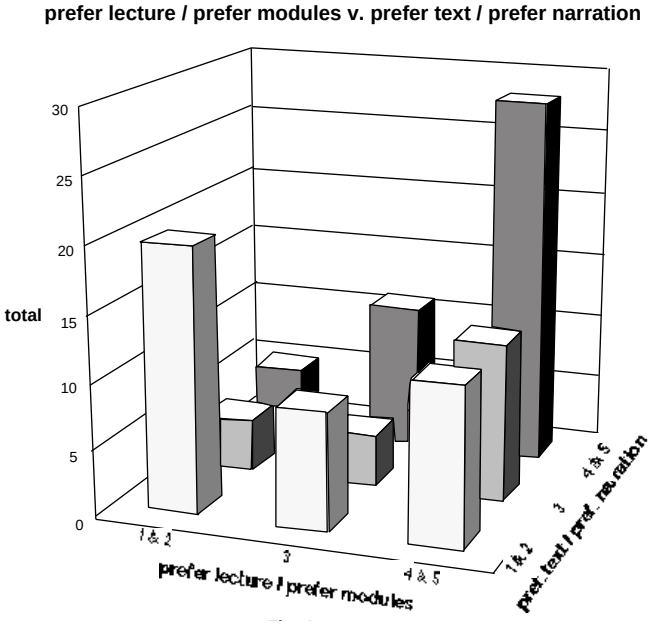

Figure 4.

for students to hear the narration. We decided to write again to all the college computer officers to explain the situation and request their co-operation in the light of these findings. We could now include individuals comments (anonymised) to support our case.

The pause button behaviour was also an important issue. A multimedia module is not a video and does not behave like one. The pause button only pauses when a subsection of narration ends, meaning there can be a fairly long delay (up to several seconds) before it takes effect. The solution is to 'chunk' the narration into much smaller sections which allows the pause button to respond much faster, and indeed later modules used this technique, as the problem had in fact been identified before the student evaluations. Narration from the earlier modules will be edited into smaller chunks and the modules updated as time permits, but certainly before the next year's cohort starts the course in the autumn. We can also provide a visual indicator of where the pauses occur; student control is the key issue here.

The poor print quality of lecture notes was the third pressing problem - but also the simplest to solve. The problem stemmed from initial preparation of screen resolution graphics (72 dpi). These prove to be of unacceptable quality on print-out and their graininess makes graphs especially difficult to read. The solution is to prepare all the graphs as vector graphics and store as electronic postscript files. This means that they can be sized when needed - either for screen or print-out and can be reproduced at any resolution. Later graphs were prepared in this way and it was decided that earlier ones will be redone and the lecture notes updated accordingly.

However, many of the comments made it clear that the respondents wanted more comprehensive notes. It would be quite possible to do this, indeed to provide the whole transcript of the narration so that it became a handout. Anecdotal evidence obtained through conversations with our student representatives indicated that examination orientated students tend to use comprehensive handouts as the short textbook; this is misunderstanding the purpose of a handout. Proper textbooks are better than handouts for reflective reading. The handouts will therefore be kept in a form, which include graphs and key points, which will add structure in the student's mind in order that they can relate the module to their reading.

Typical comments were very mixed, although broadly

positive. Here is a selection:

"Often I had difficulties where I would get stuck in a module and unable to proceed. Apart from computer difficulties the modules are good fun and very interesting!"

"In general I prefer lectures, but the modules are clear and easy to work through, and I have learnt most of the material after the first time through the module."

"It would have been better for me if there had been more on screen text to accompany the narration. Otherwise I found this method of learning very helpful."

"Text in addition to the narration is the only improvement I would seek to make ... notes were too scant and useless. Other than that BRILLIANT. All lectures should be replaced with online modules"

Comments by category and overall tone (positive, negative or neutral)

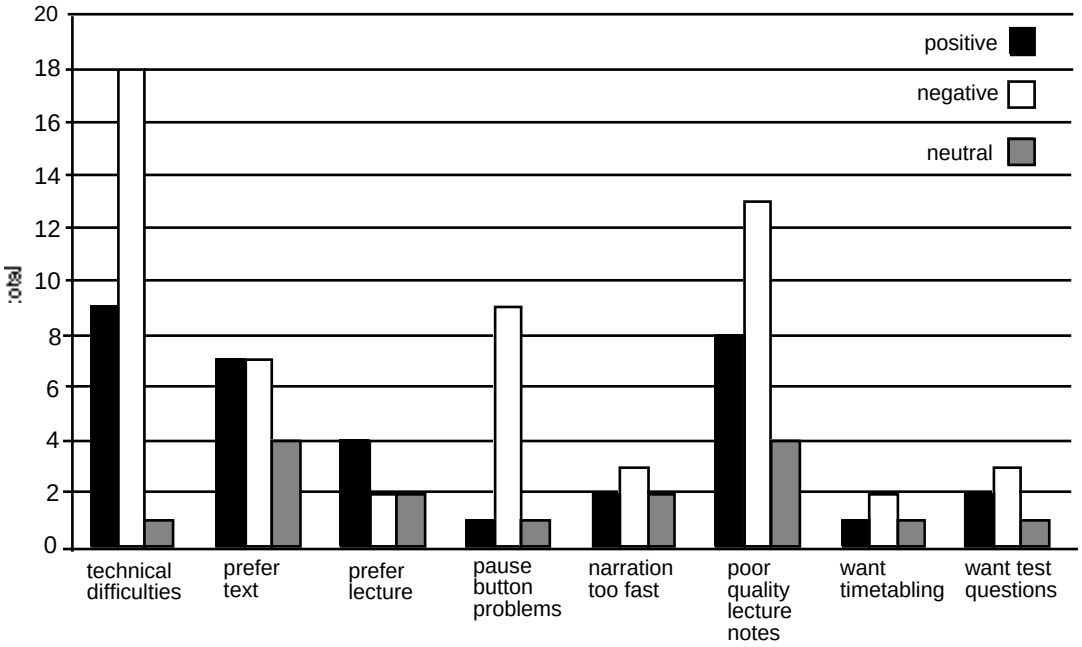

Figure 5. Comments by category and overall tone

As for the sizeable minority who expressed a preference for on-screen text, we will be conducting an experiment later this year to see if this approach is indeed beneficial. It may just be that the students think they want it (but when they get it find that they didn't want it after all). We will redesign one or two of the modules so that the text of the narration for each sub-section is displayed in the form of subtitles synchronously with the narration. These new modules can be offered to students who a learning styles test has established are very text oriented. The original style of modules can be offered to the rest of the students and we can then compare their evaluations. In any event, we should be taking heed of and catering for different learning styles (time and resources permitting).

7. Conclusion

An opportunity was given to us to transfer a whole course of Medical Sociology from a traditional course to a web-based multimedia package. What has been developed we hope does everything that lectures do, is free from the errors produced in the live situation and is just as interesting. Not all the students liked it though; those who did not preferred text, large handouts and implied that the package was a bit insubstantial and 'flashy'. We cannot though dismiss these students as reactionaries who do not know a good thing when they see it and who are convinced that learning is synonymous with hard work and boredom. We must concede that many prefer working from text and learn well that way and we should make provision for them.

8. Acknowledgments

The authors extend their heartfelt thanks to the 108 students who provided them with this valuable information. Their evaluations and comments will help to improve the modules for future years. Whilst this is of great benefit to future generations of students we understand that it is not so helpful to our 'guinea-pigs'. Consequently we fully intend to engage each year's cohort of students in evaluations at the earliest possible time, so that they may benefit from the improved modules in the same academic year.

9. References

[1] S. Heppell “Eyes on the horizon, feet on the ground” in Latchem, C. et al *Interactive Multimedia: Practice and promise* Kogan Page Limited, London, 1993

[2] D. A. Robinson, C. R. Lester, N. M. Hamilton “Delivering computer assisted learning across the WWW” *Computer Networks and ISDN systems* Vol 30 No 1 pp. 301-307

[3] B. H. Khan (ed.) *Web-Based Instruction* 1997 Educational Technology Publications, Englewood cliffs, NJ, 1997

[4] D. C. Leeder “From linear lecture to interactive multi-media module: a developer’s perspective” *Educational Media International* Vol 37 No 4 December 2000, pp. 219-224