

# The Interactive Course Map

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## INTRODUCTION

When forecasting the learning situation of the future, we often envision students working with a wide array of on-line tools – ranging from standard office productivity tools, to various kinds of communication software, to specialised learning environments tailored to particular curricular needs. In this scenario, learners are not only trying to master the subject or domain content, they must also cope with: (1) mastering a potentially complex assortment of software tools, and (2) developing new study habits to make effective use of these tools. A challenge for learners in such a situation is effectively ‘managing the media mix’ to achieve their educational objectives (Laurillard 1995). Recent empirical studies indicate that many learners, particularly those who are inexperienced with computer technologies, feel overwhelmed when faced with this new way of learning (Sumner and Taylor 1998).

We are investigating how interactive course maps and study guides can help beginning students successfully manage potentially complex mixes of new technologies to enhance their learning process. In effect, we are trying to create meta-learning environments; i.e., environments to help beginning scholars 'learn how to learn' with new media. We are currently conducting this research in the context of a new first-level course on object-oriented computing. Here, we describe the Interactive Course Map we have created for this course and discuss some of the rationale behind its design.

## SETTING: A FIRST-YEAR COMPUTING COURSE

Since the late 1960's, The Open University (OU) has been providing mixed media, distance education courses combining printed texts, television, video, audio, and home-laboratory kits. Materials are centrally produced to an academically high standard, and presented in an open learning style that is accessible to people with no previous academic qualifications. The specific setting for this work was the design and development of a new first-year undergraduate introductory computing course called “Computing: An Object-oriented Approach” being developed in the Maths and Computing Faculty here at the OU. Such introductory courses at the OU often have 3000 to 5000 students enrolled during a given presentation. Table 1 shows the resources that were created for this course, a more detailed discussion can be found in (Woodman and Holland 1996). What is striking about this table is the multitude and diversity of learning environments used to support a rich, year-long course.

Table 1. Course resources.

<i>Course Resources</i>
Printed Texts
Smalltalk LearningBooks Programming Environment
Set Book: Parsons & Oja (Parsons and Oja Second Edition, 1996)
Eleven Television Programmes
Two Multimedia Titles – ‘The Object Shop’ and ‘Grumble’s Grommets’
Electronic Glossary
World Wide Web Site
Computer Conferencing
Email
Personal Productivity Tools

## THE INTERACTIVE COURSE MAP

This project concerns the design of a multimedia element for this course, an 'interactive course map'. As shown in Table 1, the M206 course involves a fairly complex mix of media, including software, printed materials, CD-ROMs, conferencing, WWW, e-mail and television programmes. The challenge which the Map aims to address is to give the student an overview of the whole course structure, and the resources required while studying. It will also introduce the computer tools the student will be using. The map needs to present a complex situation as simple and manageable. It should help the student to feel that they are in charge of the situation, and that they need not feel overwhelmed by the pile of course materials arriving through the post.

We began by analysing the proposed course structure and resources. We identified three key strands of information: study time in weeks, a guide to block structure, and study resources. It was particularly valuable to look at the relationships between the three strands of information to be presented in the map, and from this build a visual representation.

The map (Figure 1) is composed of three main areas reflecting these strands: the course content area, the course resources area, and the tour area. The course content area consists of seven large buttons, corresponding to the block structure of the course. The course resources area is simply a list of all the resources used in the course. As the mouse cursor moves over items in the resources list or the big block buttons, these items highlight to indicate that they are pressable. The box in the tour area is used to display an 'explicador' head with headlines supporting the audio narrative. Each of the three areas will be described in more detail below.

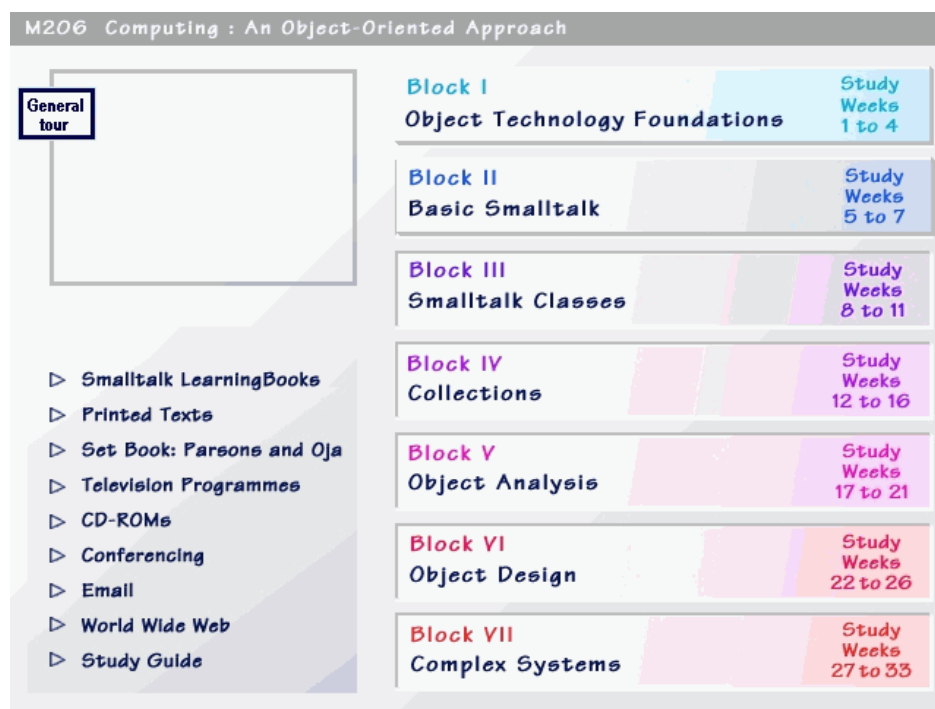


Figure 1. The Course Map.

The course content area (right half of picture) reflects the block structure of the course and provides information about what students need to do each study week. The course resources area (bottom left) provides a high-level overview of how each resource is used in the course. The tour area (top left) is used to provide students with advice about how to study and how to use the Map.

### The Course Content Area

This area has been designed to give the student an overview of the blocks and to help the student in the organisation and pacing of their own work. The time line through the course study drives the main pathway through the information. This time line is also reflected in the print materials. These are presented in a large reference binder, with dividers for each week of study. The week dividers will each carry the colour of the block to which they belong, thus linking study weeks to blocks of study. This same colour coding is also used in the Block Buttons in the multimedia map.

Pressing the Block 1 button at the top level brings up the two panes shown in Figure 2. Each block area is structured into two panes – the block overview pane (on right) and the weekly resource pane (lower left). The

block overview pane shows how each study week is composed of one or more chapters. Clicking on any chapter title will bring up a third level pane containing a chapter description.

The weekly resource pane shows what learning resources are used in any given study week and what resources comprise each chapter. As you can see below, chapter 1 consists of a printed text, a Smalltalk LearningBook, and a chapter web page. As the mouse cursor rolls over the study weeks shown in the block overview pane (on the left side), the weekly resource pane changes to show the resources used for week being rolled over. This mechanism enables students to get a quick overview of the amount and types of work they'll need to do for any given week.

Our second objective was to provide bridging support to help students make connections between general tasks or learning goals and more detailed activities in specific resources. This objective is supported by the interplay between the block pane and the weekly resources pane. These two panes are layered, clicking on one brings it to the front and overlays part of the other pane. The chapter descriptions available from the block pane focus on learning goals and high-level tasks. The left side of the resources pane shows what tools and resources are used to achieve the learning goals or complete the tasks. Clicking on the resource pane brings it to the front and makes the right side visible. For each item in the weekly resource pane, the right side of the pane discusses how the resources will be used to meet specific learning objectives. If the resource being discussed is a television programme or an interactive multimedia title, then previews or demonstrations are available on the right hand side.

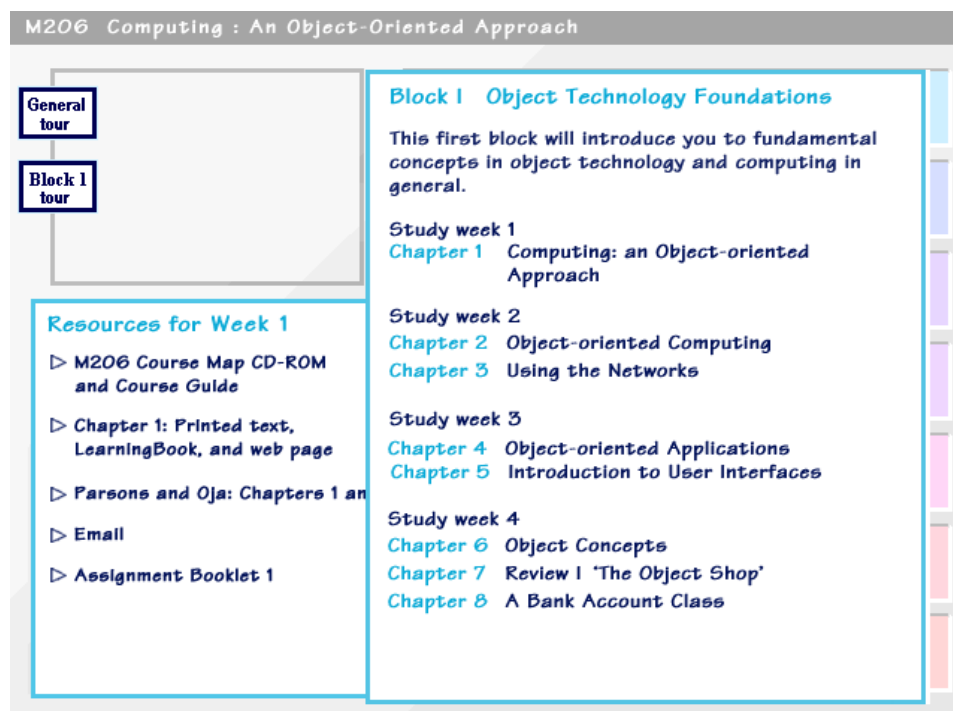


Figure 2. The Contents of Block 1.

Each block area is structured into two panes – the block overview pane (on right) and the weekly resource pane (lower left). The block overview pane shows how each study week is composed of one or more chapters. The left side of the weekly resource pane shows what learning resources are used in any given study week. The right side (not shown, under the block pane) discusses how the resources will be used to meet specific learning objectives.

The colours and fonts used in the Map were chosen to match those used in the course printed text and in the course web site. Thus, where possible, resources used in the course have a familiar and consistent ‘M206 look’, regardless of the media. By using a familiar look and following a simple and straightforward layout, we hoped to make the Map seem friendly, fun, and relatively intuitive to use. The colours used for the pane borders match the colours used to identify the different blocks (e.g., the light blue is always used for Block 1 and the deep red for Block 7). The colours are not only pleasant, they reinforce a sense of orientation. These design decisions reflect Shneiderman’s (Shneiderman 1992) findings about the use of colour:

- Principles developed by graphic artists for using colour in book, magazines, highway signs, are now being adapted for computer displays.
- Recognise the power of colour as a coding technique.

- Be consistent in colour coding.
- Design a display in monochromatic form, using spacing and arrangement for organisation, and then judiciously add colour where it will help the operator.

The basic structure of the map, with these two overlapping panes, is very simple yet powerful. We believe that simplification where possible is entirely appropriate in designing an educational multimedia project such as this. In 'The Psychology of Everyday Things', Donald Norman describes his "...fundamental principle of designing for people: (1) provide a good conceptual model and (2) make things visible" (page 13, (Norman 1988)). In 'Envisioning Information', Tufte outlines ideas which relate to our design (Tufte 1990). Though his starting point is specifically graphic presentation of complex statistical data, his conclusions can be applied more generally to visual presentation of information, i.e., "The operating moral premise of information design should be that our readers are alert and caring; they may be busy, eager to get on with it, but they are not stupid. Clarity and simplicity are completely opposite simple-mindedness. Disrespect for the audience will leak through, damaging communication."

### The Course Resources Area

The aims of this area are two-fold. One aim is to provide students with an overview of how a particular resource will be used in the course. Another aim is to provide students with global advice about how to study with the resource for this particular course. Figure 3 shows the course resource area for the Smalltalk LearningBooks; this pane is obtained by clicking on Smalltalk at the top level. Notice how the area does not describe Smalltalk in general, this is what the course is about! Instead, it focuses on describing the LearningBook<sup>1</sup> structure and how one might study using this structure.

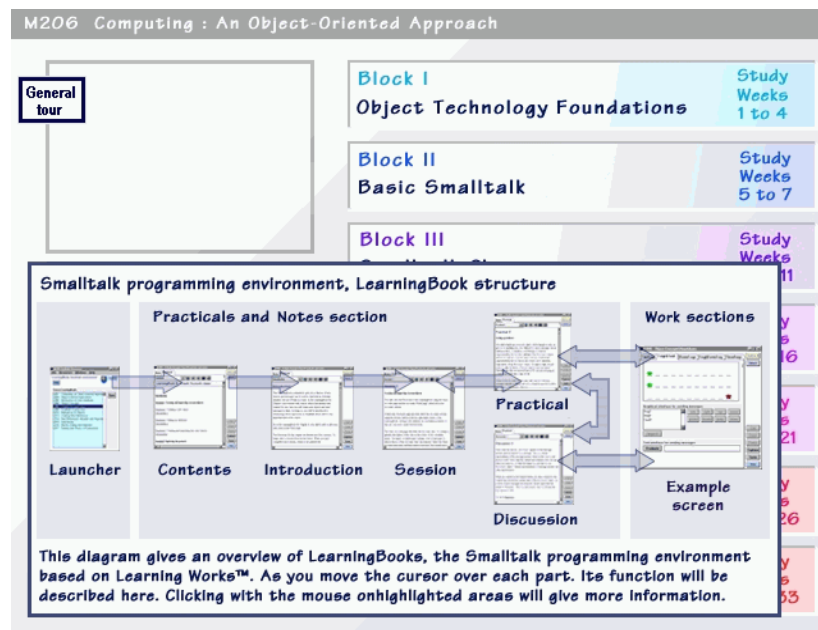


Figure 3. The Smalltalk pane in the Course Resources Area.

This pane shows the structure of the Smalltalk Learning Books. As the mouse cursor rolls over each of the pages, an overview of its purpose appears at the bottom of the pane. The arrows illustrate one idealised work flow using the Learning Books. An annotated picture showing the key parts of each page can be obtained by clicking on the page icons.

Likewise, the area on the World Wide Web does not describe it in general terms but focuses on how it will be used in the course. Specifically, it describes the supplementary learning materials available at the M206 web site and how the students will be instructed to download updates of materials from the site periodically. Even the area on television programmes contains advice on how to watch TV! Previous experience has shown that while everyone knows how to watch television for entertainment purposes, most people do not know how to watch it for educational purposes.

<sup>1</sup>The course team has developed a special version of the LearningWorks™ environment for the Smalltalk language. This environment organizes work into modules called LearningBooks that contain exercises, applications, learning worlds, and programming tools.

## The Tour Area

We have outlined the structure of the map and the ways in which it can be navigated. At this point we return to the goal of bridging between resources and course content. We wanted not only to facilitate the linking of different media with different learning experiences, but to also provide a guided experience which would take learners through the map, and show how to use it through a process of self disclosure (DiGiano and Eisenberg 1995). We combined this notion of self-disclosure with Plowman's notion of *narrative guidance* and the use of an 'explicador' (Plowman 1996).

She describes Bunuel's account at the turn of the century of people called explicadores who used to stand in front of the cinema screen interpreting for the audience the revolutionary new form of the moving picture. This was necessary because audiences had not yet built up a grammar of interpretation to allow them to understand filmic devices indicating passage of time, change of location, intensity of focus and so on. Plowman adapts this role to multimedia, arguing that users have similar difficulties in acquiring an appropriate grammar, or literacy, in the new media, so explicadores are needed to help in the process.

In the map, the explicador(s) take learners on tours of the map (Figure 4). There is a general Course Tour and a Block 1 Tour. Students can obtain print-outs of the audio scripts if they wish (this is important for supporting hearing impaired students). The Course Tour introduces the overall structure of the course, but most importantly, students are shown each of the various media and given advice about how to use that medium to maximum benefit. The Block 1 Tour steps through the different activities in each of the first four study weeks, discussing how the computer-based learning tools will be used in the different activities. The Block 1 Tour also emphasises the need to get organised and get the software installed.

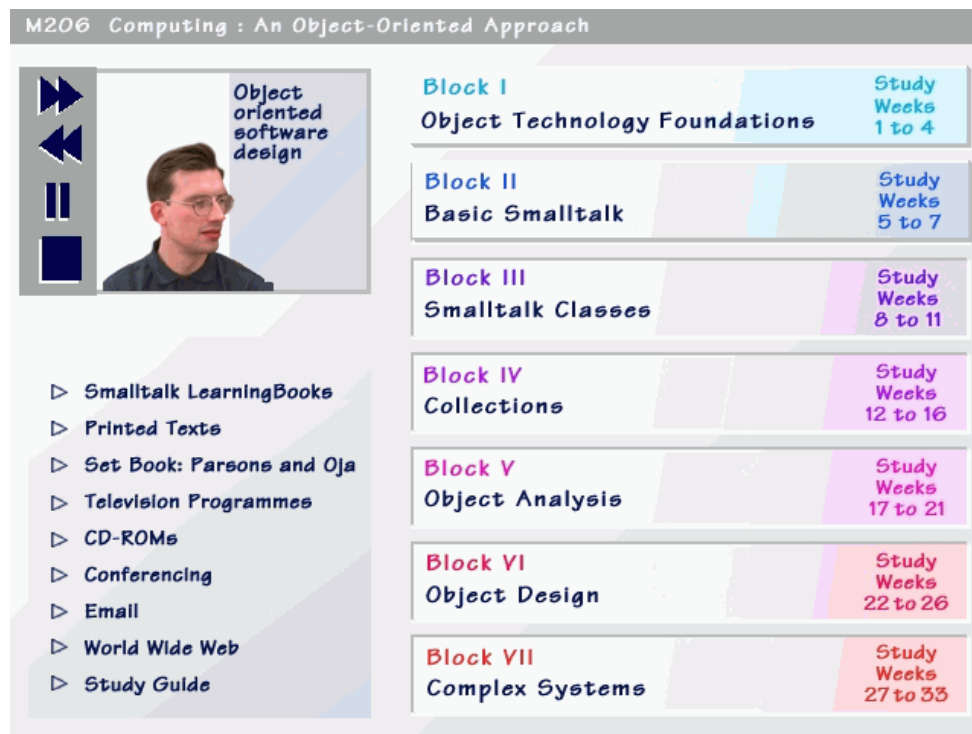


Figure 4. The Tour Area.

Tours in the Map consist of audio narrative. However, the audio is supported by: an explicador head of a course team member (upper left), headlines reinforcing key ideas, and self-disclosing actions in the Map itself.

The explicador in the Map is not a full-screen full-motion video head. Not only would such a representation be a drain on the computational resources available, thereby slowing the tour down, but we also felt it was unnecessary. The particular form of the explicador is adapted from KMi Stadium (Eisenstadt and Scott 1998) and is a low-band width format which conveys a small amount of information when attention is focused on the explicador, but otherwise stays very much in the background. We used members of the course team as explicadores (as opposed to famous celebrities or cartoons) since, from our experiences with television, we know that students enjoy seeing programmes which feature course team members because they like putting faces to names.

## **NEXT STEPS: IMPROVING THE MAP**

The Map obviously needs testing to ascertain whether or not it actually meets its design goals. We use two types of testing: formative testing, which feeds into the current round of development and is conducted intensively with small numbers of people; and summative evaluation which is based upon students' experiences with the map during the first year of the course's life.

### **Formative Testing**

We have completed the first round of formative testing (Sumner, Taylor et al. 1997). Six volunteers who are not actually registered M206 students, but who are drawn from a pool of people who would typically register for such a course, were asked to do two tasks. Each task consisted of taking a tour first and then using the map to find things as needed to answer three questions. After completing the tasks, each participant was asked questions about the tours, the map layout and structure. Each session took approximately 1.5 - 2.0 hours.

In summary, the findings were that all participants were very enthusiastic and positive about the overall look and feel of the map, and had very few problems navigating, seeming easily to find the things we set them to look for. We were most anxious about the tours however, because there was a strong chance that people might find them simply irritating, and of no use whatsoever.

Our testing results alleviated our concerns. All six participants described the tours as 'helpful' in the following specific ways: for taking them through the structure of the course phase by phase, for introducing the media and for showing them how to use the map itself. All participants said they would probably listen to all, or parts, of the tours several times. The drawbacks, however, were that the tours, as written, tended to cover too much, too fast. Most people were comfortable with the general content and level of description offered, but wanted more time to assimilate what they had just heard. To address these shortcomings, we have re-written and simplified the scripts to eliminate detail, and we have synchronised the audio track and the text more clearly to help prevent cognitive overload.

As a result of using the Map (with tours), 5 out of 6 participants were able to clearly articulate the structure of the course and the rather complex structure that 'chapters' might have (e.g. printed text, electronic learning books, web pages and television programmes). Additionally, everyone was able to articulate the general role of major resources in the course; i.e., that conferencing was for communicating with other students and tutors, whilst the web was a resource area for getting updates to course materials. We regard this as a measure of success.

As a final part of the testing, we asked people to select descriptors (e.g., boring, technical, approachable, interesting, hard, fun, etc.) from a stack of cards that best described the course as they perceived it after using the Map. Most participants claimed that the organisation of the Map and the tours made the course look well-organised, interesting, and approachable, yet challenging due to the subject matter. Several participants who stated that the course looked approachable noted that they would normally not have the confidence to take such a technically challenging courses. A few felt it even looked fun! In our view, the map clearly made a large contribution to people's overall positive perceptions of the course.

### **Summative Evaluation**

Obviously, testing involving such small numbers can only tell us a certain amount. Ideally, there would be a mechanism to allow us to test the map on a number of people between 6 and the 3-5 thousand that will sign up for the course, but unfortunately, we are unable to do this for both financial and organisational reasons.

However, we have strategies for tracking usage during the presentation of the course. The key point for us is not so much to ascertain whether students CAN use the map (which is the main focus of formative evaluation), but DO they use it? We may find that we still do not have quite the right level of description to provide the bridging function between media and content in actual practice. Students may respond that the map was a good idea, but it just didn't quite work. To collect large grain data from a swathe of students, we will use electronic questionnaires aiming to discover how useful they found the map as an introductory device, how much they have used it since, and how they think it could be improved. To illuminate this data we would like to track a few students in some detail, getting them to complete much more fine-grained questionnaires as well as interviewing them about their work habits using the map. We may even try to deliver a couple of boxes of M206 materials to students ourselves to observe the unpacking and first use of map CD-ROM in reality.

## **CONCLUSIONS**

In summary, many students can feel overwhelmed when facing a new way of working and learning. We hypothesised that meta-learning environments could alleviate this problem by helping students take control of

their learning process, making clear the relationships between resources and learning goals, and helping students stay oriented as the course proceeds. We have built an initial version of such an environment: The M206 Interactive Course Map and our experiences with the map so far are very promising.

So what next? Do meta-learning environments only fulfil a short-term need? With increased exposure to tools, environments and media, will students develop the kinds of skills and literacies that eliminate the need for meta-learning environments? We don't think so. In both the short and long-term, the need for meta-learning environments will not disappear. We accept, as a fundamental principle, that learners need support from their teachers, no matter how sophisticated their materials are, or how elaborate the learning environment is. This support may be provided in a variety of ways, and need not always be from the human teacher to the learner on a one-to-one, face-to-face basis. But we can – and do – confidently assert that students will always need help!

## ACKNOWLEDGEMENTS

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## REFERENCES

- DiGiano, C. and M. Eisenberg (1995). *Self-Disclosing Design Tools: A gentle introduction to end-user programming.*, Symposium on Designing Interactive Systems (DIS '95), Ann Arbor, MI (August 23-26), ACM Press.
- Eisenstadt, M. and P. Scott (1998). KMi Stadium: Experiences in Large-scale Telepresence. *Knowledge Web*. London, Kogan Page.
- Laurillard, D. (1995). "Multimedia and the changing experience of the learner." *British Journal of Educational Technology* ,26(3): 179-189.
- Norman, D. A. (1988). *The Psychology of Everyday Things*. New York, Basic Books.
- Parsons, J. J. and D. Oja (Second Edition, 1996). *New Perspectives in Computer Concepts – Comprehensive Edition*. Albany, International Thompson Publishing.
- Plowman, L. (1996). "Narrative, interactivity and the secret world of multimedia." *The English & Media Magazine* ,35(Autumn): 44-48.
- Shneiderman, B. (1992). *Designing the user interface: strategies for effective human-computer interaction*. Palo Alto, Addison-Wesley Publishing Company.
- Sumner, T. and J. Taylor (1998). *New Media, New Practices: Experiences in Open Learning Course Design.*, Submitted to: Human Factors in Computing Systems (CHI '98), Los Angeles (April 18-23).
- Sumner, T., J. Taylor and C. McKillop, "Developmental Testing of the M206 Interactive Course Map," *Knowledge Media Institute*, Technical Report, The Open University, Milton Keynes, 1997.
- Tufte, E. R. (1990). *Envisioning Information*. Cheshire, CT, Graphics Press.
- Woodman, M. and S. Holland (1996). *From Software User To Software Author: An Initial Pedagogy For Introductory Object-Oriented Computing.*, First ACM SIGCSE/SIGCUE Conference on Integrating Technology into Computer Science Education, Barcelona (June).