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PRODUCING EDUCATIONAL MULTIMEDIA — EMPOWERING INDIVIDUALS OR BUILDING TEAMS?

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Introduction

Producing multimedia for education is a new activity for most academic institutions, requiring new skills. Experience so far suggests that a team approach to production is appropriate and that it is not yet possible for individual academics to produce high-quality multimedia teaching materials on their own.

In 1992, The UK Higher Education Funding Council funded a number of multimedia projects under the Teaching and Learning Technology Programme. One of these, the Biodiversity Consortium, involved 58 universities collaborating over a three-year period in the production and implementation of multimedia teaching software in the biological sciences. Production and administration were concentrated in four universities, of which the Open University was one. The Consortium is continuing its work, but now operates as a self-funded group.

As a distance-teaching organization the Open University is well-placed to contribute to the Consortium. Although the tutorials the Consortium produces are being used primarily in 'traditional' universities with full-time, resident students, they are being studied by individual students, without direct staff contact, in a self-paced environment — distance learning in all but name.

One of the original aims of the Consortium was to provide academics in Biology Departments with a suite of tutorials on Biodiversity that they could customize for their own use. Central to the Consortium's plans was the production of a software delivery shell that would both streamline production of courseware and provide a tool that individual lecturers could use to produce their own teaching material. This approach offered two advantages.

Firstly, it would stimulate acceptance, in individual universities, of tutorials produced outside. There is considerable resistance among lecturers to using teaching material that they have not prepared themselves. Secondly, it would provide the means for academics to embrace a new teaching method and still retain ownership of the courses they taught. As one of the Consortium Directors, Professor Wendy Hall of Southampton University, expressed it — lecturers would be empowered to produce their own materials.

How far has the Consortium gone towards achieving these goals?

What multimedia teaching can offer

Multimedia can perform a wide range of educational tasks and the technology is developing so fast that we don't yet have any feel for the limits of what can be achieved. However, one fundamental principle has emerged and that is that, at least in the biological sciences, good multimedia teaching is image-led. This is not just because the computer screen is not the place to read large quantities of text. Extensive use of high quality still and moving images provides the added value that makes the medium attractive to students, gives them a more memorable learning experience and, above all else, supplies them with experiences that they could not easily get through any other single medium. High-quality images are the key to effective teaching through multimedia. Most students now are sophisticated viewers who regularly see very high quality educational footage on TV and may well play or have played computer games with very good graphics. These students will expect the visual elements of educational software to be at least as good as they have experienced elsewhere.

Quality graphics and video were, therefore, recognized by the Consortium as essential. Producing them, however, requires skills and technology not normally available to academics.

The academic input

The Consortium provided support for those academics from the universities who wanted to write multimedia tutorials, in the form of training, a software shell, a photographic library on photo-CD, video from the BBC Natural History Unit and professional graphics design from the BBC (Open University Production Centre). With this level of support it was intended that individual academics should be able to write a script for the software shell that would specify what images would be required. The images — photographs, drawn graphics, animations or video — would then be provided as separate resource files which the software shell would display according to the academic's script. Once a library of resources was available, individual academics could use it, together with their own images, to generate new teaching materials whenever they needed them.

We have not been able to achieve this objective so far, although the Consortium has produced high quality multimedia teaching materials. The reasons are instructive and have led to a different approach, which shifts the emphasis from individual to team.

The shell and its contents

The Consortium's plan to adopt a 'shell-based' approach to multimedia production, with presentation via a standard software tutorial shell, into which teaching materials can be inserted using a scripting language, has been fully implemented. Called the 'Scholar's Desktop', the shell that has been developed is entirely devoid of content and could equally well be used in any subject area for delivering multimedia teaching. All the resource files in a multimedia tutorial are external to the shell itself and are easily modified, giving maximum flexibility for individuals to customize any tutorial for their own use. In addition, the shell allows teaching staff to make links to other software, using Southampton University's Microcosm software. Microcosm allows apparently seamless links to be made between a Scholar's Desktop tutorial and a word-processed document, a spreadsheet, a database, a computer simulation, or even another multimedia tutorial, thus providing almost limitless ways to extend and modify the basic tutorial.

The scripting language that inserts the teaching materials into the shell is not difficult to use and multimedia packages can in theory be assembled very rapidly. In practice, however, the rate of production is severely limited by the availability of the images.

Two elements contribute to this slowdown of production. The first is that specifying images, producing graphics, photographs, animations and video, and orchestrating their appearance on screen, are all skilled tasks. The necessary skills are unlikely to be combined in a single individual — almost certainly they are not skills that the average academic staff member possesses. The second element is the availability of photographs and video that do the job required. Quite often, we have found that suitable images either do not exist or it is too expensive to acquire the rights to use them in a multimedia package, even for educational purposes. Obtaining the necessary rights to include an image in a tutorial is a complicated process and a skill in itself; few academic staff have the experience and knowledge to deal with rights issues. In many cases they do not even appreciate that rights clearance is necessary.

From this analysis, we concluded that, at present, only a team approach to production was possible, but the team we needed was of a new type, not previously assembled in the academic world. The Open University has used the team approach to production of educational material since its inception and is now developing a team approach to production of multimedia. The Biology Department is currently involved in producing course materials using either the Biodiversity Consortium shell or an authoring language. In both cases a team approach has been essential.

The team approach

Multimedia production requires a wide range of skills and an equivalent range of people to provide them. The production model we have followed is based loosely on that used in educational TV production, where an academic works together with a television producer and the appropriate specialists — graphics designers, editors, etc. — are brought in when needed. For multimedia production, however, we found it essential to involve the specialists right from the start, because the teaching strategy, the images and the software are so dependent on each other.

One particular project provides a good example of our approach. *The Human Brain* — a CD-ROM on the structure and function of the human nervous system — is being produced for the Open University's *Biology Brain and Behaviour* course (Hall and Robinson, 1995). The course has been running in various incarnations since the 1970s and the latest version, dating from 1992, includes course textbooks, video, television, and audio tutorials. The CD-ROM is being produced mainly from these materials, plus other resources available within the Open University and the BBC, using a modified version of the Biodiversity shell. It will provide 30 hours of student study time out of the 360 hours allocated to the course.

Given that all these resources are available, the basic teaching strategy for a distance learner is already worked out, and the software shell already exists, this project is a good model for the way we envisage much new multimedia courseware being developed in the future.

Since we have the shell and the resources to go in it, it might seem that producing *The Human Brain* should be relatively straightforward. But from the start we found it necessary to assemble a team that includes academics, BBC producers, software designers, television graphics designers, computer graphics specialists, computer programmers, an editor and a project co-ordinator. The extent of each person's involvement is obviously different, but the range of skills that they bring to bear is an indication of why building a team is probably the best approach. The expertise of each team member in their specialized field ensures that everything produced is of high quality.

An academic author must obviously provide the content, writing text and specifying what the images must show. The images have to be designed for presentation on screen — which requires different skills from designing illustrations for textbooks or lectures — and the layout of each screen must be carefully designed to ensure that materials are presented in pedagogically the most effective way. An editor is essential to maintain continuity between resources developed by different members of the team.

Another vital skill is the ability to structure the courseware. There are three aspects to this. Firstly, individual screens and individual media must be linked together in the most effective way. The BBC producers on our team have been invaluable here. Secondly, regard must be paid to how the student is going to navigate through the tutorial. If particular teaching objectives are to be met, we feel it is necessary to provide the student with a clear route through the materials so that they don't get lost and can be sure they have studied everything they need to. Thirdly, interactivity is a vital component of an effective tutorial. The skills of a good software designer are essential in addressing these last two aspects.

Does the team approach have any disadvantages? With a large number of people working on a project it becomes necessary also to include a project coordinator to ensure everyone's activities are complementary and that there is sufficient information flow between team members. It is also important to build the team carefully so that academics can feel ownership of the courseware produced. Traditionally, individual academics have written their own lectures or distance teaching material and they have largely 'owned' that material in the sense that they have made all the decisions necessary to produce it. This has not been true of educational television, with the result that many academics are reluctant to use it. Nor will it be true of multimedia, unless care is taken to build feelings of ownership in members of the team.

The future

The experience of the Biodiversity Consortium and the Open University has been that, for Biology teaching using multimedia, assembling a team with the appropriate mix of skills is the best way to reach the quality standards that we feel are essential. This does not mean that teams will always be required. New initiatives that make graphics resources freely available within the education sector will make it easier for lecturers to embrace the new teaching technology. A software shell is already an extremely valuable tool that assists the production process, but we are not yet in a position to empower an individual academic author to produce their own high-quality multimedia material on their desk-top.

Reference

Hall, M. and Robinson, D. (1995) The multimedia brain. *Active Learning*, 3 (December 1995), 36–41.