Comparison of two approaches to the funding and production of multimedia interactive computer resources – A case study

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Abstract. Funding, organisation and outcomes of two multimedia production projects are compared and contrasted. It was found that the objective of the funding body has a profound effect on the final product, as does the terms of such funding. The question of how to motivate and reward contributors to projects such as these needs clarification. There are methods in place to credit academics for excellence in teaching, but not for CAL production. In particular, e-mail communication creates problems, because of lack of urgency in responding to relatively informal appeals for material. Another handicap in one project was the expensive administrative effort needed to produce detailed financial accounts. It was concluded that, although valuable CAL resources had been produced during both projects, over-reliance on e-mail is injudicious, and all objectives in a projects must be given due attention.

1. Introduction

A series of learning modules covering a wide range of Textile and Mechanical Engineering subjects is being distributed on CD-ROM by UMIST Department of Textiles Computer-Aided Learning (CAL) Group.

The modules were produced by two entirely different funding and organisational methods, one originating in the UK (12 modules), and the other originating in Europe (3 modules). Valuable lessons were learned from both these projects. The aim of this study is to compare and contrast the two production methods, focussing on the financing and the development staff, the problems which arose, the skills achieved and the form of the final product.

2. Development funding and organisation

The development of computer-aided learning material or "courseware" is an expensive and lengthy business. Experts in academic subjects, software developers/authors, computer experts, graphics and animation experts, all need to pool their efforts in the production of material. In addition, pre-launch testing and evaluation must be carried out. Production of courseware in academia, rather than in a commercial publishing setting, normally requires external funding. Fortunately, governments and other funding bodies are now convinced of the value of CAL, and are prepared to offer encouragement in some form. As mentioned above, two sources of funding were utilised, the first from the UK government via the HEFCE (Higher Education Funding Council for England), the second from the European Commission.

The UK government funded TLTP initiative (Teaching and Learning Technology Programme), was launched in 1992. UK universities were invited by the TLTP to form consortia to bid for funds for producing CAL [2]. The Department of Textiles at UMIST organised a consortium of eight engineering and textile departments from six different higher education establishments (see below) with the object of producing CAL material for first year degree level students. The project was entitled CATEEC (Computer Aided Technology and Engineering Education Consortium) and was accepted by TLTP in 1993.

The funds were supplied in three tranches with the final tranche payable on delivery of the product. The courseware was completed in stages.The final sections were completed in 1999 and distributed to UK universities at a nominal price. Courseware is being sold to a range of educational establishments and to industry (at home and abroad) at a price which generates sufficient funds for up-dating and some further development.

A different approach was evident in the Europe-wide Socrates initiative, under which the second CAL project under review in this article was funded. In 1995 the European Commission made grants available to encourage educational co-operation and information exchange between member states. Consortia were invited to bid for this 'Thematic Networks' funding, and one of the conditions for acceptance was that partners should be from several member states. The bid was originally made through a pan-European thematic network named the AUTEX (the Association of European Universities of Textiles) and was named ProTecT (the Programme for Technical Textiles).

In an attempt to minimise the administration, the Commission enforced a combination of three projects, namely ProTecT, PIE (Plastics in Engineering), which was co-ordinated in Portugal and ACO-MAS (Advanced Control and Manufacturing Systems) based in Greece. This new combined project was known as the Applied Engineering Group and was co-ordinated from Greece.

The Applied Engineering Group worked successfully for one year of the three year timetable. In an attempt to further reduce their administrative burden, the Commission decided to reduce the number of thematic networks and arranged a 'shotgun wedding' between the continuing members of the Applied Engineering Group and a larger network known as H3E (Higher Engineering Education for Europe). Hence ProTecT became a member of H3E.

The ProTecT bid for funding, which had been submitted by UMIST (the lead body), was for partial funding (approximately 50%) of the production of a Europe-wide database of technical textile companies and an integrated set of learning packages on technical textiles. The material was all to be in the English language. The funds were to be supplied yearly, after submission of detailed reports of costs incurred and time spent.

The final funding promised was cut to 20% of total cost, with no reduction in the aims and coverage. As the consortium believed in the project, it was decided to continue even with the low level of support. Commission funding, however, has been conspicuous by its unreliability.

The resulting courseware is in the final stages of production, and will shortly be distributed to establishments who were involved in the production and who contributed material. The ProTecT material is of a similar calibre to the CATEEC material, and will be sold similarly at home and abroad.

3. Aims

The stated aims of TLTP were to make higher education more efficient by harnessing modern technology, and to help institutions to respond to and manage increasing student numbers [3]. Additional aims were to enrich students' learning experience, to enable students' learning to be organised on a more

flexible basis, and to support the development of university staff expertise in CAL production. The funding was seen as 'pump priming' to encourage university academics to create further CAL efficiently and economically.

Within the TLTP frame, CATEEC's aim was to produce CAL material which would provide basic learning resources including demonstrations of the principles of textile machinery to prepare students for subsequent laboratory work, and also in some cases replace basic laboratory work. There were other benefits intrinsic to the package:

– Ability to show processes operating deep inside a machine.
– Freeing of valuable machinery for research.
– Resources for institutions which have insufficient or no demonstration machinery.
– Increased time for staff to deal with students, e.g., for tutorials.
– Resources for training in industry.

Twelve modules were developed under this initiative.

The aim of the European Commission was to promote the European dimension of higher education in Europe. The aim of H3E was "Educational co-operation and information exchange" and the aim of ProTecT was an in-depth study of technical textiles. This was to lead to the production of a Europe-wide database of technical textile companies and a set of learning packages on the main areas of technical textiles. Three modules were developed under this initiative.

4. Production teams

UMIST was the lead body in the CATEEC consortium. The other members of the consortium were based at:

Bolton Institute of Higher Education,   Manchester Metropolitan University,
Huddersfield University,   De Montfort University.
University of Wales Cardiff,

UMIST was also the lead body in the ProTecT consortium bid. Other member establishments were based in:

Germany (Aachen and Dresden),   UK (Leeds and UMIST),   Finland (Tampere),
Spain (Catalonia),   France (Lille),   Italy (Turin),
Belgium (Gent),   Portugal (Minho),   Netherlands (Twente).
Sweden (Gothenberg),   Greece (Piraeus),

5. Subject matter

The UK funded CATEEC courseware covers the technicalities of textile manufacturing processes and the machinery used for textile production. It covers machines and products from initial design to finished goods. The subject matter is drawn from both Engineering and Textile Technology.

The CATEEC material consists of twelve modules:

Clothing Production,	Manufacturing Technology,	Textile Testing,
Coloration,	Nonwovens,	Weaving,
Hydraulics and Pneumatics,	Printing and Finishing,	Fibres,
Knitting,	Rolling Element Bearings,	Yarn Production.

The European funded ProTecT courseware, on the other hand, covers the many applications and end-use requirements of Technical Textiles, rather than the details of their manufacture. The overall presentation style, however, is similar in all fifteen of the modules.

The ProTecT material consists of three modules:

Medical Textiles,
Geotextiles,
Industrial Textiles.

6. Features of the courseware

One of the main strengths of the CAL medium is the visual method of conveying information, via diagrams, photographs, animations, hypergraphics (multiple zoom to exhibit magnified portions of photographs and diagrams), and video. These techniques are especially useful for demonstrations of machinery, and are extensively used in the CATEEC courseware.

Text and hypertext, whereby successive layers of detailed written information are accessed at will, are characteristic of most CAL material, and this facility is used throughout, especially in the ProTecT modules.

7. Production of CATEEC courseware

Each module was produced at a single establishment. For each module or subject area, several local experts were recruited to contribute to the decisions on content, and the details of the subject matter. In order to form an outline of the syllabus, the developers worked with subject experts and produced paper-based material as a starting point. A prototype was then created on the computer, and the experts' help was re-enlisted. This allowed necessary amendments to be made, improvements to be added, and new interactive features to be incorporated, as the subject specialists became aware of the potential of this new medium. The "hotword" facility (i.e., clicking on a word for more information) was an example of a feature which became more heavily utilised at this stage. The developers of each module were always based in the same establishment as the main author.

8. Production of the ProTecT courseware

Following the completion of the database of technical textile companies, the ProTecT consortium concentrated on the development of the CAL packages. In contrast to the procedure for the CATEEC project, three ProTecT action groups were established, with the remit of co-operating in gathering information on Woven, Knitted, and Nonwoven Technical Textiles. These groups each had members distributed among

the participating establishments. Discussions were carried out by e-mail. The action groups had an average of 6 members, typically from at least 4 academic centres, usually situated in several different countries. To allow easier co-operation of content authors during the early stages and encourage groups to cross-fertilise when providing content for the packages, it was planned that the woven, knitted, and nonwoven action groups should each contribute to the three CAL modules (geotextiles, medical and industrial textiles).

All development of ProTecT courseware was carried out at UMIST, where expertise in production had already been gained during the CATEEC project.

9. Problems encountered during production of courseware

One area of difficulty encountered during the CATEEC project was in persuading academics to contribute their hard-earned knowledge and intellectual property to the courseware. There was the justifiable feeling that they would not be personally rewarded for their efforts in the same way that they would when teaching directly, and that they would lose control over the delivery of the material. There is also no formal way of evaluating CAL productions in the research evaluation process, as there is for journal and book publications. In addition, the production of material for courseware is time consuming, and academics with high student numbers are pressed for time. The students' immediate needs take priority over their long term needs, which might very well be served by expertly written courseware.

The main area of difficulty encountered during the ProTecT project, was in actually transferring the material to UMIST. Some material was garnered from the working groups by e-mails, as a result of direct questions to individual members, but handling the transfer of the massive amount of knowledge and information which undoubtedly exists in the European working groups, to the developers at UMIST, proved difficult. A round-robin e-mail invitation to all members of each action group to send their material met with little response. It became apparent during the project that members had in some cases not even received e-mails addressed to them, for various reasons. The problems included changes of academic site, changes in hardware and software, differences in software versions and e-mail encoding differences.

Both projects suffered delays at the outset. One "chicken and egg" problem with this type of project is well known to most academics:

– until you have approval for a project, you cannot take on staff;
– if you have staff, the time delay before bids are approved is so great that you may lose you staff;
– the time between approval and the start date of the project is rarely sufficient to find suitable staff;
– hence the project is late starting.

10. The effect of project aims on the form of the products

One of the long-term aims of the whole TLTP project was to establish CAL expertise amongst academics, and this was achieved to some extent by the CATEEC teams. Though few academics actually became expert in the first-hand production of material, they at least became familiar with the medium as a whole, and its potentialities. This stated aim meant that academics were involved as much as possible in the actual authoring of the material, and moulded it to their own concept of what was required.

Consequently, the different modules have characteristic styles. The final editing and preparation for release imposed a minimal degree of "house style", in that the navigation and help facilities are uniform throughout, but in the opinion of the authors, a refreshing flavour of the individual character remains.

Another aim which had a powerful effect on the form of the CATEEC material was that of replacing (or substituting for) laboratory equipment. The CATEEC material thus has a greater reliance on animations and graphics than does the ProTecT material, where replacement of equipment was not one of the stated aims.

To take a broader view, the aims of the Socrates initiative were much less definitive than those of the TLTP project. "Educational co-operation and information exchange" can be achieved by a multitude of means, and lead to a multitude of end results. The aims of the ProTecT bid (production of a database and a learning package) were a little narrower. It is laborious to produce a database, but the method is plain. However, "An in-depth study of technical textiles leading to a learning package" can also take a variety of possible forms. The non-specificity of this aim meant that more discussion had to take place in the action groups before a plan of action could be decided.

The two aims of the ProTecT project (production of 1. a database and 2. a learning package) were at first sight closely related. The gathering of information for the database was carried out by questionnaire, and the manufacturers' answers to questions such as "What are your products?" or "What is your main raw material?" could indicate the areas to concentrate on in the CAL package. Also, the growth of new end-uses must also be an area of interest, which also featured in the questions. Thus, the first aim had potential for determining the formation of the second aim. However, feedback from the database to the action groups came did not help greatly in decision-making on the form and content of the learning package. There were various reasons for this:

– delays in the database finalisation limited the use;
– response was relatively poor in some countries;
– not all countries were represented;
– although the questionnaires provided excellent information of the situation of the industry, little information was provided by respondents in the open questions on end-uses.

The fact that there were two aims may have lead to an unequal division of effort, with the completion of the database taking priority over the provision of material for the CAL package in the early stages. It may have been reasonable to delay the decisions regarding content until the database had been completed, but due to the limited amount of content-relevant information coming from the database, there was little reason to allow this delay. Consequently, the CAL information was gathered directly from manufacturers and the literature, and took a more product-oriented approach, and a less industry-sector Europe-oriented approach, than might otherwise have been the case. The relative weights of the separate industrial sectors did not therefore determine the relative space accorded to each in the package.

11. The effect of project organisation on the form of the products

The organisation of the projects had profound effects on the contents. Where groups were situated in one establishment (as was the case for the CATEEC project), co-operation and information gathering was comparatively easy, once academics had been convinced of the value of the exercise.

Where interaction takes place by e-mail (as was the case for the ProTecT project), the informal nature of this medium, while it is useful for preliminary discussions, rather tends to stand in the way of heavily

information-loaded material. Another result of e-mail informality is the lack of any urgency to respond to requests for material, or for feedback on proposed content. There were thus a greater number of communication difficulties in the ProTecT project [1]. The ProTecT funds were on a much smaller scale than the CATEEC funds, so only two developers were employed, based at UMIST. This meant that the majority of the information for the CAL package was gathered from within UMIST's resources, and from the more active action-group members. This may have lead to a UK slant to the material, instead of a concentration on specific European content.

12. Conclusions

The objective of the funding body has a profound effect on the final product, as does the terms of such funding. This is reflected in the differing forms of the CATEEC and ProTecT material. The first is high in graphic content, the second is more text-based.

Communication difficulties arose during the ProTecT project because each action group member was in a separate establishment, and e-mail was the main communication means. Its apparent speed and directness are offset by the disadvantage of informality and non-accountability. A non-personal e-mail to a large group divides the responsibility for response. Each individual may feel that someone else would be able to deal with it better than they themselves could. This meant that their potential contributions could not be utilised.

With hindsight, one question which needs an answer is "What is the best means for transferring material?" Action groups were given freedom to chose how to transfer material, but perhaps more time should have been spent on exploring alternative methods. E-mail attachments worked well, but some forms of material do not lend themselves to this method. From the experience gained, it is believed that file transfer (FTP) should have been the major transfer system for content.

The ProTecT project had two aims, in contrast to the single aim of the CATEEC project. This may have caused the ProTecT action groups to concentrate on one aim, at the expense of the other. One of the Protect tasks had a very clear objective, to distribute a questionnaire and make a database. The other Protect task was much more open-ended, and thus may have lost priority.

Due to the "chicken and egg" problem with project bid approval, start-up delays are almost inevitable. It would be more efficient if the start time of a project could be delayed to allow for organisation of staff, possibly even by the same amount of time that it takes for bids to be approved.

The question of how to reward contributors to projects such as these needs some further thought. The academic contributors to the CATEEC project would have been even more willing to give their time had some system of credit been in place. At the start of the project great claims were made for the value of these projects, to be considered in the four or five yearly Research Assessment Exercise (RAE). By the completion of the projects, this "important aspect" had fallen victim to a change of chief executive and new thinking. CAL work then had little or no value in the RAE. There are, of course, methods to credit university lecturers for excellence in teaching, so perhaps CAL production will benefit from this. Even so, the credit for either teaching or production of CAL is never likely to approach the credit achieved for research. This will always be a limiting measure on the success of this type of project.

The members of the action groups in the ProTecT project received limited financial return, as a significant proportion of the funds had to be channelled to the preparation of the accounting returns. In addition, delays and requests from the commission for ever more detailed financial information, created disillusionment amongst consortium members, who were having to fund the work themselves. Even at the time of writing, much of the promised funding still has yet to materialise from the Commission.

However, both the CATEEC and the ProTecT projects produced effective CAL, and successfully overcame the most of the difficulties. The major aims were achieved, and students of textiles and mechanical engineering will be well served by the funding provided by the UK government and the enthusiasm of academics.

References

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