Enabling learning through technology:

some institutional imperatives

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This paper considers the importance of the institution as the dynamic interpretative element on which will depend the successful integration of the learning technology developed through our national initiatives into the academic curricula of Higher-Education institutions. Based on our experience of working on teaching technology programmes, within the framework of national and institutional initiatives, it is evident that the establishment of an institutional strategy, and its implementation in a supporting university-wide programme of staff development and training, together with strong commitment at the senior managerial level, are imperatives which determine the successful integration of learning technology within academic institutions.

Introduction

The imminent completion of many Teaching and Learning Technology Programme (TLTP) projects means that a considerable number of courseware deliverables will soon be available to Higher-Education (HE) institutions. The Higher Education Funding Council's intention in funding the Programme (HEFCE Circulars, 8/92, 13/93) was to ensure their integration into academic curricula by providing institutions with an opportunity to review their 'teaching and learning culture' with regard to the embedding of learning technology within their institutional practice. Two recent workshops, conducted with a representative sample of newly appointed academic staff in connection with the evaluation of materials to be included in a staff development pack whose purpose is to encourage the use of IT in teaching and learning (TLTP Project 7), strongly suggested that the availability of courseware alone was insufficient to ensure its integration into educational practice. The establishment of enabling mechanisms at the institutional level, as well as within departments, was crucial to ensure the effective use of learning technology.

Institutional commitment

The priorities of the national teaching technology initiatives which have been funded during the last decade (CTI, ITTI, TLTP) have reflected the increasing capacity and functionality of hardware and software as well as the growing emphasis on curriculum development. There has been a development from computer-led initiatives to pedagogically driven priorities. It is within the institutional context that these nationally identified objectives, institutional policy and implementation meet, where policy is developed and programmes delivered. The institution is the dynamic interpretative element working between the national and local levels, yet to date the institutional perspective has been the least regarded.

In a recent ITTI project, which investigated the core IT skills which were required by university staffs in order to execute their job functions, the institutional context, particularly the strength of institutional support, was found to be the most significant factor influencing implementation and practice. The report (Hodgson *et al.*, 1994) was the result of a nationwide consultation exercise in which about a quarter of UK universities participated. Initial advisory discussions were conducted with representatives of the variety of interests which contribute to the formulation of IT and teaching and learning policy – IT managers, staff development advisers, teaching and learning co-ordinators, and senior managers. Sixteen universities, drawn equally from the former UFC and PCFC sectors, went on to form internal working parties to identify which core IT skills were required within their institutional context amongst academic, administrative and clerical staffs, thus enabling them effectively and efficiently to operate their job functions consistently with institutional priorities. Each institution collected relevant background information about itself, then defined and conducted the business of its working party in order for the results to be most informative for its own forward planning as well as reporting back to the project.

The institutional reports indicated that there was an already pervasive use of information technology across institutions and that its application in all areas of a university's business was rapidly increasing. Generally, staff had a positive attitude to the use of information technology, and expected to be offered the opportunity to develop their skills further. Current training provision was, however, often patchy and uncoordinated and was likely to be supply- rather than needs-driven. It was not always related to institutional needs.

Effective information technology training provision was most likely to arise from firm commitment at the institutional level. The foundation of this commitment was the development of an institutional information strategy with associated faculty or departmental strategies. These strategies would incorporate responsibilities for the installation of up-to-date technology, made widely available across distributed networked systems, together with the provision of appropriate training opportunities. There needed to be a clear relationship between institutional strategy, staff development and training programmes. It was essential for this relationship to be reflected in effective resource allocation mechanisms, especially in a devolved budgetary organization.

For the delivery of training programmes, a structured approach was preferred. This might

be based on the identification of core skills, related to particular job functions. A 'bricks' approach, where the skills were defined in terms of levels, would enable training provision to link the acquisition of particular skills and levels to specified institutional functions. The strong staff development interest would ensure coherent and co-ordinated provision for individual members of staff while supporting the effective implementation of institutional planning.

In order to ensure responsiveness to user needs, the programme would encompass a variety of learning opportunities. Although traditionally these have mainly been provided through taught courses with supporting documentation, new learning methods and mixed media were now available to enable increased flexibility and customization in delivery. The recognition of informal methods of learning, such as training selected staff to undertake limited training responsibilities within their section, would maximize the use of relevant expertise and experience.

An identified group of staff for whom particular provision was urgently required was senior managers. They were responsible for the formulation of policy and its implementation. They needed to be aware of, if not actually competent in the use of, the wide ranging power of modern computer networks and its impact on institutional practices, as well as the implications of the pervasiveness of technology for future planning, including job functions (TLTP Project 45).

Teaching Technology Initiatives

The institutional imperative emphatically to support staff development within the implementation of a university-wide policy to encourage, support and develop the use of information technology in teaching and learning has been implemented at the University of Durham through two Teaching Technology Initiatives posts. These staff work in partnership with academics to review their course structure, content, delivery, assessment and evaluation methods in respect of the appropriate and effective use of IT. They co-ordinate the dissemination of knowledge and increase awareness about developments in computer-aided learning. The awareness program includes university-wide and departmental presentations and hands-on sessions, staff development sessions, contributions to text-based newsletters, and running mail groups. Development work in departments includes advice, information and the development of substantial courseware projects. To date, courseware has been developed successfully for projects in archaeology, chemistry, education, geography and Spanish.

Selecting software for successful courseware

The success of courseware in achieving educational objectives is in part dependent on selecting the most appropriate development tool. The learning objectives must be analysed, then clearly defined in order to evaluate which software would be most suitable to achieve these educational goals.

Consequently, at the University of Durham, courseware has been developed in:

- the core spreadsheet application – *Quattro Pro for Windows*
- the assessment package – *Question Mark Professional*
- the authoring package – *ToolBook*

Learning Errors in Measurement in Chemistry was developed using the University-recommended spreadsheet, *Quattro Pro for Windows*, to utilize its spreadsheet functions. The first-year chemistry students start by acquiring a foundation knowledge of Quattro Pro, using the self-study guides of the Computer Literacy Programme. The students need to understand how to navigate through Quattro Pro in order to be able to use the full potential of the courseware. They then use the CAL material in supervised practical sessions as an integrated part of their course.

Students read the explanatory text, and are then directed to pages of exercises. They learn interactively by calculating their own values for the exercises and entering them into the spreadsheet. The built-in spreadsheet functions are used, through macros, to make the graphs change according to their values and to check their answers. The students click the Am I Right? button to find out if their answers are correct or need modifying. The courseware is based on random numbers, so the students all have different values for their exercises, and are able to start again with new values if they wish. There is a summary page which holds all the values entered by students and the students are requested to give a hard copy of this page to the lecturer.

Question Mark Professional is an easy-to-use computerized assessment and examination program. Its strength lies in its analysis and reporting facilities. As part of the preparation for a departmental test, a General Knowledge Test has been written to enable the

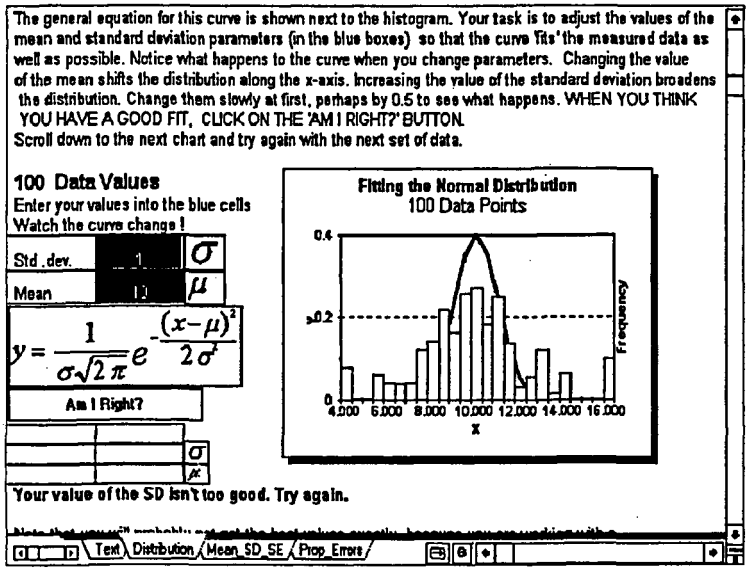

Figure 1: Errors in Measurement *developed in* Quattro Pro.

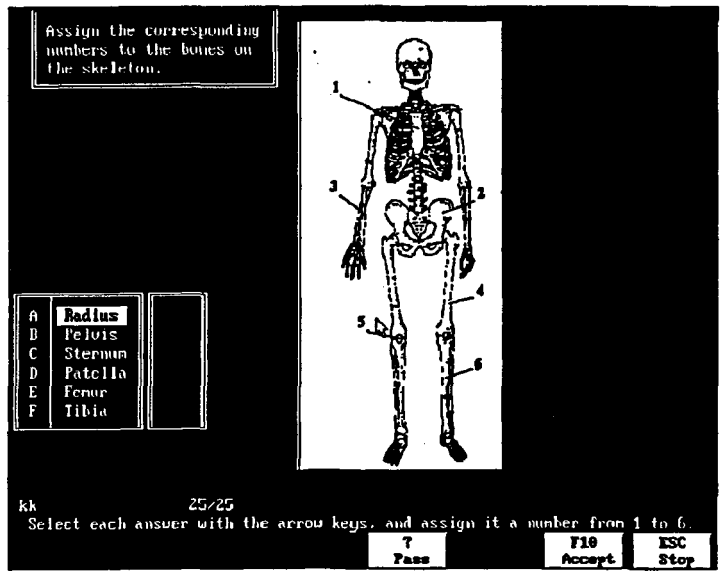

Figure 2: General Knowledge Test – Question Mark Professional

students to attempt the different question types available in *Question Mark*. At the end of a departmental test, the students were asked if they found the software easy to use, and 97% found it 'Easy' or 'Very easy'. This positive result is partly due to the students being able to become familiar with the package through the General Knowledge Test.

Until recently, Spanish syntax had been taught using only lecture notes. Students had found this topic difficult to grasp, and the aim of the *Spanish Syntax* project is to use the hypermedia facilities of *ToolBook* to enhance the learning of the subject material through interactive examples and tests. Colour is used consistently throughout the courseware to identify the different syntactical units of sentence structure.

There are different types of exercises, including tree diagrams, following each explanation of the syntax. In many of the exercises, the students click the Am I Right? button to find out if they have completed the exercise correctly. If they have not answered correctly, they are given hints, e.g. on vocabulary or abbreviations. After two attempts, the answer is given to them. This is to allow the students to be able to learn through their mistakes and progress to the next question. The students use this CAL material as an integrated part of their course.

Conclusion

Firm institutional commitment is imperative to enable learning through technology. A clear relationship between an information technology strategy, staff development and training provision, supported by appropriate resource allocation mechanisms, is essential to ensure coherent and co-ordinated provision for all staff.

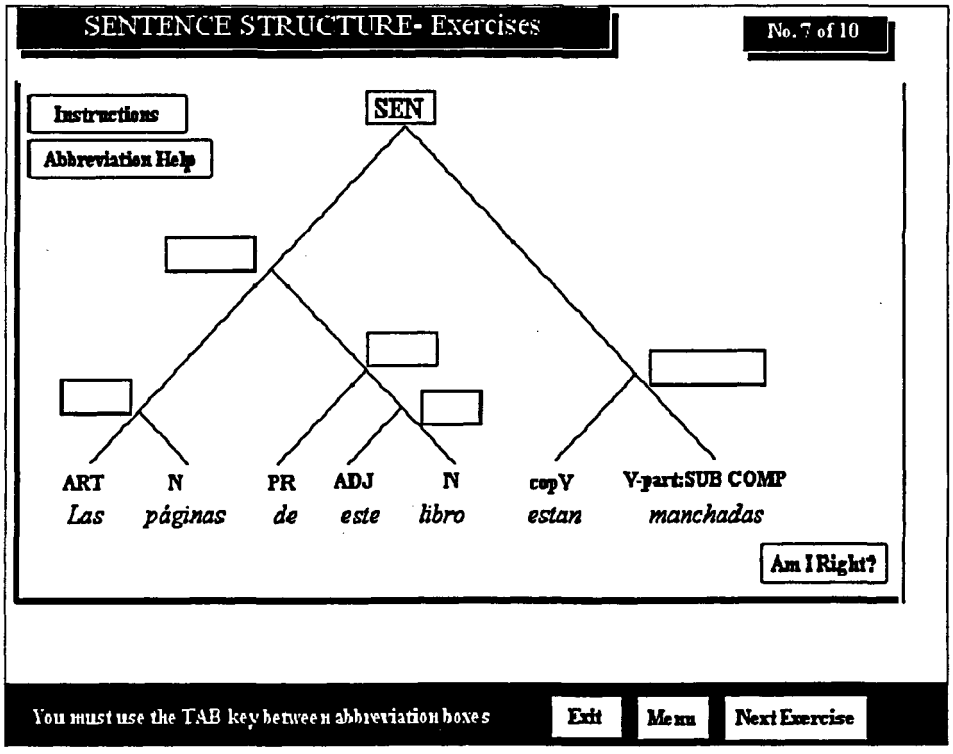

Figure 3: Spanish Syntax – ToolBook

Selecting the most appropriate software for the development of courseware has resulted in successful and enjoyable learning. All the courseware and computer-based assessment is delivered on the campus-wide Novell network, so the students are able to progress at their own pace and repeat sections and exercises.

References

Computers in Teaching Initiative (1984), University Grants Committee.

Core IT Skills for Teaching and Learning in Higher Education: Tools for the Development of a National Framework, TLTP Project No. 45.

Hodgson M., McCartan A. & Hare, C. (1994), *A Framework for the Development of Core IT Skills for University Staffs*, CVCP/USDU Publications.

Information Technology Training Initiative (1991), Universities' Funding Council.

IT In Teaching and Learning: A Staff Development Pack, TLTP Project No. 7.

Teaching and Learning Technology Programme Phase 1 (1992), HEFC(E), Circular 8/92, March.

Teaching and Learning Technology Programme Phase 2 (1993), HEFC(E), Circular 13/93, April.