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Law Courseware: The Next Generation

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Abstract: We claim that the contract courseware team has contributed to moving law courseware forward a generation in three main ways. First, we have sought to apply the body of modern educational theory to the development of good quality courseware. Secondly, we have acquired, catalogued and shared know-how on:

- Modeling law courseware
- Creating varied and more sophisticated student/computer interactions
- Improving the quality and impact of informational content

Finally, we have sought to a make use of some suggestions by recent commentators to improve the quality of our courseware.

Introduction

A. The Law Courseware Consortium

Interest in the development and use of interactive computer-based learning software for law (law courseware) is by no means new. However, the arrival of the Law Courseware Consortium (the Consortium) has produced the critical mass of income, interest, involvement and industry that is transforming law courseware development from a cottage industry into a large-scale, academic production line.

The Law Courseware Consortium was set up in 1992 with a grant from the HEFCs' Teaching and Learning Technology Programme (TLTP). Within its initial three-year life-span, the Consortium aims to develop and distribute courseware covering seven areas of English law and two areas of Scottish law. The specific goals of the Consortium may be summarised as follows:

- To develop law courseware of high educational and technical quality
- To promote the widespread and effective use of law courseware in the higher education community
- To provide a springboard for the further development of law courseware (Law Courseware Consortium, 1992)

But it is not just the availability of TLTP funding that has brought about this new era. With the

benefit of hindsight, we can now fully appreciate the role played by an acceleration in the rate of technological advance. On the hardware front, processors have become much faster, memory and storage capacities have mushroomed, and communication networks are growing and intertwining almost visibly. On the software front, the dinosaur-like DOS operating system has been almost completely swallowed up by the more mammalian Windows environment. Windows itself has given birth to a profusion of highly developer- and user-friendly software tools and packages. Finally, multimedia appears now to be the message.

B. The Purpose of This Paper

The authors of this paper, who are lawyers rather than computer scientists, have both been swept up in the first wave of the Consortium's work as members of the contract courseware team. Our main purpose in writing the paper is to explore some theoretical and practical issues that have arisen thus far in the development of contract courseware. We hope that such an exploration will be of particular interest to those who are (or will be) engaged in the development and evaluation of law courseware, and of general interest to those who will be involved in the implementation of law courseware within the higher education sector.

First Generation Courseware

Background

For more than a decade before the founding of the Consortium there was growing interest and involvement in the development of courseware. However, this era is best characterised as a time when there were a few isolated but dedicated individuals distributed around the law schools putting together primitive versions of what we may now think of as first generation courseware. In this 'cottage industry' period, these developers worked away at their pet projects with little recognition or regard from their colleagues, their institutions, or the academic world at large. In particular, developers could not normally expect to receive any time off from teaching and research duties to undertake courseware development work. Co-ordination and standardisation of such matters as educational approach and interface design were, at first, non-existent and, at best, limited.

As for the technology that these pioneers had to work with, the kindest thing that can now be said is that it was quaint. Certainly, from the early 1980s, a courseware author might at least aspire to having a personal computer nearby or even on his/her desk. However, processor speeds were positively pedestrian by modem standards, memory and storage capacities were measured in pitifully few kilobytes and computer communications was a contradiction in terms. Most screens were still monochrome and graphics were more primitive than cave paintings. These contraptions were held together by a series of arcane operating systems culminating in DOS.

The BILETA Resource Book

A catalogue of first generation law courseware was put together in a resource book produced by BILETA and the CTI Law Technology Centre based at Warwick University (Paliwala, 1991). Accompanying the resource book was a collection of courseware packages comprising:

- A number of tutorials by a variety of authors using an authoring tool called Lexical as part of an ESRC funded research project on constructing a methodology for law courseware (Leith, Paliwala and Jones, 1992)
- A set of contract tutorials developed by Max Young at Luton University (Young 1986, 1991)
- A set of contract tutorials developed by a team at Durham University (Downes, Pritchard and Widdison, 1991)
- Tutorials covering the Matrimonial Homes Act and covenants affecting land by Peter Sparks at Southampton University

- A tutorial on misrepresentation by David Scott of Warwick University

Besides the above collection, the BILETA/Warwick resource book itself listed some twenty other tutorials or sets of tutorials most of which were available for distribution to interested law schools.

Critique

1. Criticisms - The collection of first generation courseware that was distributed with the BILETA/Warwick resource book was examined as part of an independent review of available literature and materials by Allen and Robinson (Allen and Robinson, 1992). The first task that these two writers set themselves was to consider the extent to which available courseware packages met the aspirations of their authors and the educational needs of law schools. As a result of this review, Allen and Robinson identified several 'disappointing trends' in first generation courseware. These included:

Studies that compared the performance of courseware users with those using the traditional methods indicated that there was no difference in test results between these two groups. Courseware was primarily being used simply to supplement the teaching of black-letter law

Because of factors such as the monolinear structure of much courseware and the over-emphasis on primitive multiple choice interactions, its use tended to be restricted to rote learning and revision of basic material. As such, courseware was not stimulating cognitive development in students (cf. Burris, 1987)

Overall, first generation courseware had not only failed to match early predictions that it would revolutionise law teaching methods, but also, indeed, had made very little impact on the traditional approach to law teaching at all

Concluding their remarks on these disappointing trends in the BILETA/Warwick collection of courseware: Allen and Robinson stated:

"It will be very discouraging if this is all that CAL can or will do for legal education, as it will have perpetuated the failure to teach the higher intellectual skills. Unless this is overcome, CAL can and should only play a minor role in higher legal education." (Allen and Robinson, 1992:279)

2. Suggestions for Improvement - The third and final task that Allen and Robinson set themselves was to put forward suggestions, based in part on their own development work in this area, for enriching the interaction between students and future law courseware packages. We can divide these suggestions into two families:

1. Those that involve using artificial intelligence (AI) techniques in courseware development (Jones, 1992)
2. Those that involve bringing other non-AI techniques into development work.

Let us begin by examining the use of some well-established AI techniques. First, it has already been observed that most courseware at this time was monolinear in structure. Allen and Robinson advised courseware developers to move away from this constricting design and to adopt more sophisticated, multilinear (branching) structures - 'a complex flow chart of questions.' Such an algorithmic approach is one that is very familiar to developers of rule-based expert systems (Capper and Susskind, 1988). Second, the writers felt that students should be given the opportunity to ask questions of the courseware. Again, this technique has been widely used by expert system developers (e.g. Widdison, Pritchard and Robinson, 1993). Thirdly, Allen and Robinson advised nesting the courseware within a hypertext database of materials that students might wish to consult while undertaking the courseware exercises (Ashley and Aleven, 1991). Again, some expert system

developers have been thinking along similar lines for some years (Greenleaf, Mowbray and Tyree, 1991).

Besides these well-established approaches, Allen and Robinson raised the possibility of using either less advanced or less established AI techniques. They wrote longingly of natural language recognition before accepting that this area remains resolutely intractable. They also discussed the notion of 'DIY' courseware - inviting students to put together their own expert system-based problem solving software. The experience of one author of this paper, at least, indicates that law students are not yet likely to welcome such an invitation warmly.

Concerning the use of other, non-AI techniques, Allen and Robinson made several suggestions. They enthusiastically extolled the more widespread use of interactive video (see Clark, 1991; Killingley, 1992) and computer simulations (e.g. Gibbons, 1992) while accepting the limitation that these approaches were notoriously resource-hungry. Finally, they commented favourably on an experiment involving the provision of an environment in which students put together arguments graphically, constructing and manipulating a diagrammatic proof tree on screen (Routon, 1991).

Pedagogical Problems and Research into Student Learning

Models of Learning in Law Schools

To be useful to law schools courseware must, to some extent, fit with the objectives and methods in legal education generally. But the development of courseware also provides opportunities to think again about these objectives and methods, and to use these new thoughts as a proactive force in legal education. The criticism has often been made that law schools do not take the findings of educational research seriously and persist in using teaching methods that are ineffective for the objectives sought (Leighton and Sheinman, 1986; Fitzgerald, 1993; Mackie, 1990). At the very least it seems to us that those who are developing courseware using public money, and for the use of law schools generally, have a responsibility to investigate teaching and learning and to make their objectives clear. It is not true that law schools are themselves always so explicit about what they are doing, but in this section we attempt to model the different approaches to learning in law schools (cf. Jackson, 1991: section 3). The analysis here only fits loosely with the analysis of the Jackson Report. This modelling is not based on empirical research, nor does it refer to any particular law school.

1. The Transmission of Knowledge Model - Teaching as Telling

For some law teachers teaching consists of transmitting knowledge to the students who will receive and digest it. Students are learning when they are acquiring new knowledge, by sitting in lectures or reading in libraries. When students fail to learn, typically it is because they are not working hard enough in their study time (Ramsden, 1992:15). Small-group teaching typically consists of testing whether the students have learnt what they were told in the lectures, or what they have read in the text books. This model comes in two variants. The traditional model is a professional one, in which the subject matter transmitted is knowledge of legal rules and principles (cf. Jackson, 1991: para 3.3). The social science variant on this model makes the same assumptions about how students learn (i.e. through being told) but changes the subject matter to explore the role of law in society, its impact on different social groups and its social origins.

2. The Management of Learning Model - Teaching As Organising Student Activity

This approach to teaching and learning shares with model 1 that it is known and fixed what it is that the students have to learn. However in this model, students are assumed to learn not through being told, but rather through activity (Ramsden, 1992: 15). The teacher's role is structuring and managing this activity to achieve the desired learning outcomes. Enormous amounts of energy may be given to preparation of detailed and highly structured materials, and seminars may have activities timed to the

second. One implication of this model is that the quality of the student's learning will depend not so much on the substantive knowledge of the teacher, but rather on the teacher's knowledge and application of teaching methods. Particular emphasis may be placed on development of skills, in addition to legal principles (compare the Paedagogic Model and Functional Professional Models in Jackson, 1991:3.4, 3.6).

3. The Learning Environment Model - Teaching as Making Learning Possible

This third model drops the assumption that the knowledge that students will learn is fixed or known. With the abandonment of this assumption, also abandoned is the assumption that the teacher will know all the subject matter to be learnt by the students. Ramsden expresses this model in this way:

> "Student learning is a long and uncertain process of changes in understanding. Teaching and student learning are parts of the same whole; understanding students' ways of thinking about the subject matter is essential to effective instruction. The activity of teaching and the process of reflecting on it are inextricably linked. Problems in learning may be addressed by changing teaching, but with no certainty of success. Constant monitoring is needed, as yesterday's solutions might not work today." (Ramsden, 1992:16).

Within this model teaching is likely to be more interactive and participatory, assessment patterns are likely to involve a substantial degree of student choice, and learning outcomes are likely to be less predictable, in the sense that what students learn will depend on what happens in the classroom and where they take their learning in terms of reading, thinking and writing. Students are likely to be encouraged to carry out their own research (compare Jackson, 1991:3.5, The Academic Cutting Edge model). These models are not totally distinct. For example the apparent adherence to models 1 or 2 may hide the actual pursuit of model 3, and there is no fine dividing line between them. Any particular law school may combine elements of all three models. The models are useful, however, in identifying the range of objectives that law schools have for student learning and the teaching and learning methods that they imply.

Research on Student Learning

In the past twenty years there has been massive development in the activities and methods of educational researchers specialising in learning in higher education. This research has been used to support the development of training for teachers in higher education. Paradoxically, however, the insight from this research has been brought primarily to new entrants to higher education teaching, with the consequence that management of higher education has often not reflected this new learning. Fitzgerald (Fitzgerald, 1993:23) notes: "There appears to be an epidemic of ignorance of educational theory among teachers in higher education and particularly teachers of law." We do not claim expertise in this subject but rather indicate the kinds of questions that we have asked.

1. What Students Learn

What students learn may be conceived of as comprising both substantive knowledge and intellectual development. The substantive knowledge that students are expected to learn in law schools varies from institution to institution, but aims are generally made clear, and substantive knowledge is generally tested in each course each year, through formal examinations and/or continuous assessment. Rather less attention, however is paid to general intellectual development. Most law students are encouraged to acquire basic lawyers' skills involved in reading cases, and sometimes statutes, synthesis of case law in essays and application to problem solving. But the ambition to promote the development of broader intellectual skills and abilities is less frequently referred to. Ramsden reports the results of interviews with adults that found five different understandings of learning:

> "1. Learning as a quantitative increase in knowledge. Learning is acquiring information or 'knowing a lot'.
> 2. Learning as memorising. Learning is storing information that can be reproduced.
> 3. Learning as acquiring facts, skills and methods that can be retained and used as necessary.
> 4. Learning as making sense or abstracting. Learning involves relating parts of the subject matter to each other and to the real world.
> 5. Learning as interpreting and understanding reality in a different way. Learning involves comprehending the world by reinterpreting knowledge." (Ramsden, 1992:26).

We can see in this schema a continuum within which 1 represents the most shallow form of learning, whereas 4 and 5 represent processes of rich intellectual development. The concern with substantive learning is located at 1 and 2, understanding 3 recognises the importance of acquiring skills and methods (such as those basic lawyering skills), whereas 4 and 5 indicate some more fundamental and universal forms of learning which may be classed as intellectual development rather than merely acquisition of substantive knowledge. The criticism has sometimes been made that law schools tend to encourage students to think in terms of concepts of understanding number 1 and 2 above and never reach the more fundamental forms of understanding reached in 4 and 5 (Hunt, 1986).

2. How Students Learn

More problematic than the question 'what students learn' is the question 'how students learn'. The simplest answer to this question is that students seem to learn through engagement and activity with the subject matter. But their approaches to learning, and the approaches that they are encouraged to take by their teachers, can determine the depth and quality of learning. In particular the objectives which students identify or are encouraged to identify in their learning may be powerful in shaping the depth of their learning, whether it is merely learning as acquiring information or learning as interpreting reality in a different way. Signals to the students about learning objectives include the statement of course objectives (if any), the way that teaching is conducted, the assessment pattern, the extent of training in research and other skills and other less obvious signals. Learning as acquiring information is often characterised by an atomistic approach in which links between distinct parcels of knowledge are not made, and in which students never acquire a broader framework in which to understand. By contrast, learning as interpreting reality in a different way often involves the student in developing an holistic approach in which areas of knowledge are linked in an overall structure (which may be provisional and fluid) and interrogated in various ways (Ramsden, 1992:42).

3. Variables in Teaching and Learning

These insights into student learning suggest that university teachers have considerable choice in relation to structuring what and how students learn. In particular, where teachers want to foster intellectual development and more fundamental understanding of their subjects, they may be able to structure teaching in ways that build upon students experience, which involve students in choices and activities in relation to their learning, which make learning objectives explicit and which promote assessment and feedback patterns which motivate students to deep rather than surface approaches to learning (Gibbs and Habeshaw, 1989: chapter 2 "Powerful Ideas in Teaching"). This insight would be valuable to law teachers generally, but we attempt to suggest the potential and the problems in applying it in courseware development.

Problems of Applying Educational Research to Courseware

Lack of Knowledge of Development Teams

The team involved in the development of the contract courseware initiated discussion of learning

objectives at its earliest meetings. Similar discussions were held in the Scottish teams and elsewhere and they spilled over into more than one of the sessions. Two things were apparent. First, that those involved in the development of the contract courseware had little experience of articulating learning objectives, and secondly, that where they began to articulate such objectives, consensus was hard to reach. In retrospect we feel that insufficient steps have been taken to remedy the knowledge deficit. The greatest assistance has come from a team of psychologists advising the team at Strathclyde (Anderson, Tolmie and Howe, 1993). Perhaps the development of better knowledge of student learning would have promoted more consensus (or perhaps not!).

Lack of Consensus in Development Teams

In the contract courseware team it was clear that some members were interested in developing the testing aspect of courseware that dominated the first generation. Characteristics of this approach were that students should be expected to learn a core of knowledge, including basic principles, case names, key legislation, etc. and be able to provide answers to questions on their knowledge that the courseware would assess as right or wrong. A strength of this approach is that it provides a task that the courseware can achieve with relative simplicity, and it gives students immediate and clear feedback on their progress.

The weakness of the approach is that it may be seen to foster shallow approaches to learning based on acquisition of knowledge, leaving more complex forms of learning to other forms such as the classroom. The danger here is that students may begin to replicate simply the shallow approach of the courseware, never fully internalizing the deeper and more complex approach encouraged in the classroom.

Other members of the team suggested that the courseware developers ought to attempt to harness the technology in the development of the more complex and interesting aspects of learning, pushing at the boundaries of what had been attempted with first generation courseware. The strength of this approach is that it will encourage a higher degree of understanding among students using the courseware. The problem with this approach is that it requires the development of a wide range of processes and activities in the courseware which stretch the imagination of the authors and the technical skills of the Consortium's technical director. A particular problem has been the question of feedback and assessment. A strength of first generation courseware was that the "testing" approach solicited answers that the computer would mark as right or wrong and a score was achieved. We have seen that assessment and evaluation are important aspects of fostering understanding. Yet first generation methods of precoding multiple choice answers, or providing for parsing of freeform answers to see if the 'correct words' are in the students answers, tend to encourage the student to think in terms of single right answers, and consequently to adopt a shallow approach to understanding, involving regurgitation of facts (albeit legal facts). A key challenge of 'reimagination' for development teams is therefore reimagining a schema of evaluation and feedback in which computer-assessment was only one of four techniques, the others being self-assessment (for example through comparison with the computer's answer "Do you think your answer is better than, the same or worse that ours?"), peer-assessment (through sharing answers in real time, through exchange on email or conferencing systems, or through downloading, printing and bringing to class), or tutor-assessment through the same method. What is important is not that students are given feedback as a score or a grade. Class teachers give encouraging feedback in class, without the embarrassment of grading the contributing students. And in fact the variety in assessment and feedback may prove to be a strength of the courseware in moving students beyond scoring to thinking more deeply about their learning.

The Contract Courseware Team

The contract courseware team consists of self-selecting volunteers who were interested by what the Consortium was proposing to do. As with all the Consortium teams (outside Scotland) the central

role in courseware development is played by the Consortium director Abdul Paliwala, the technical director John Dale and the administrative staff Moyra Butterworth and Bernadette Royall. The contract team is lead by Robin Widdison from Durham, an experienced first generation courseware developer. Max Young from Luton University and Tony Downes from Reading University also bring considerable first generation courseware experience to the team. The two LSE team members, Colin Scott and Hugh Collins brought scepticism rather than experience in relation to first generation courseware. At an early stage agreement was reached on which twelve major topics would be covered, with a view to tackling most of what we believe is presently taught in law schools (in England, Wales and Northern Ireland - Scotland has its own tradition and its own Courseware group), and aiming to cover these topics in twelve units. Each team member volunteered to author two units (four for Robin Widdison), and we agreed that each author should have a substantial degree of autonomy in selecting the approach to be taken. We have thus adopted an anthological approach that will have unity supplied by the fact that the look and feel of each unit will be the same, because all authors use the Consortium authoring tool. Hugh Beale at Warwick agreed to act as expert evaluator of the developing contract courseware and has attended many of the meetings, which have been held every two or three months.

Building Second Generation Courseware

Addressing the Issues

The contract courseware team was the first team to begin work in earnest. Consequently, it was the first team to address the issues concerning the attempt to jump forward a whole courseware generation. What ought second generation courseware to consist of? What should it contain? How should teams set about building it? In answering these questions, there were few comforting footsteps in which to follow. No satisfactory pre-existing body of knowledge and know-how to tap. Considering the terms of the proposal submitted to the TLTP Law Courseware Consortium, 1992), published critiques of first generation courseware (Allen and Robinson, 1992) and more general educational literature, we set about putting together a theoretical blueprint of what we were aiming for. Converting the theory into practice was, of course, another matter entirely.

In Search of a Model

The preliminary task that we set ourselves was to devise and agree a working model of second generation courseware. As it turned out, we found this reasonably easy to do. The finished product would comprise three distinct but interlinked components. These were:

A set of workbooks

- A resource book
- A notebook

We saw each component as corresponding to, or at least reflecting, an existing learning activity undertaken by law students. Each workbook would be a set of interactive exercises for students to do. These exercises would be similar to the types of exercises that they would be asked to do during a group tutorial session. We started with no illusions that we could persuade the technology mimic the full richness and variety of dialogue that can take place between tutor and tutees in a good tutorial. However, we did believe that we could encapsulate something like the interaction that commonly takes place in the early, 'building block' phase of a tutorial. The resource book was envisaged as either a cases and materials' book or, more likely, a full scale electronic library. It would be in hypertext form but also provide a key word search facility. The resource book would be accessible by students via 'hot words' whilst working through the exercises in the workbooks. It would also be accessible as a 'stand alone' resource in its own right. Finally, the notebook would equate to a paper-based students' notebook. It would be available to students at all times and would

be able to hold not only the students' own notes and jottings but also passages and extracts that the students chose to cut out the work book or the resource book.

Workbook Development Issues

Owing to pressure of space, we will confine ourselves here to a detailed discussion of some workbook development issues. Thus far, at least, the workbooks have proved to be the most challenging and stimulating part of our authoring work. Therefore, we have concentrated most of our efforts on the workbooks and have progressed faster and further with them than with either the resource book or the notebook components.

1. Structure

We began with abstract discussion of various possible structures for the workbooks. We considered a broad range from traditional monolinear structures through to multilinear systems of increasing levels of complexity and sophistication. We tended to share the views of such writers as Allen and Robinson (Allen and Robinson, 1992) that monolinear designs were too restrictive. On the other hand, a central aim of the Consortium was to produce deliverablecourseware, by a deadline and within a limited budget (Law Courseware Consortium, 1992). In our view, these constraints prevented us from exploring the full possibilities of advanced multilinear structures. Eventually, we settled for workbook structures that comprised a linear 'mainline' supplemented by some remedial branches for struggling students and, possibly, some advanced branches containing elaborations and additional materials for strong students.

2. Prototyping

Broad agreement as to structure was not necessarily matched by agreement on all other matters, at least on a theoretical level. Despite (or because of) these disagreements, we decided to shift our activities onto a more down-to-earth level and so began to engage in the concrete process of prototyping. In essence, prototyping involved each author putting his preliminary ideas for a particular workbook into some sort of solid form. The virtues of this process were:

- Some disagreements turned out to be no more than misunderstandings
- Other disagreements diminished significantly when subjected to technological constraints to which we were all subjected

Yet other disagreements could be more readily defined and considered through the process of comparing practical working examples

Workbook development know-how could readily be acquired, catalogued and shared among other authors

As to the prototyping itself, two members of the team had some prior experience of using software authoring tools/programming languages. These two were able, from the start, to produce on-screen mock-ups of their ideas. Initially, the other members of the team were forced to 'script' their prototypes on paper. However, it had always been the Consortium's goal to enable and encourage authors to build workbook prototypes in a simple electronic medium. The Consortium's technology director, while engaged in building tailor-made workbook delivery software, had put together a complimentary tool - an easy-to-use workbook editing tool. The benefits of encouraging authors to use this editing tool were seen as being:

- Giving authors first-hand experience of the look, feel and limitations of the electronic medium
- Involving authors closely not only in writing the scripts but also co-directing the on-screen 'performance' (Laurel, 1993)

- Speeding up the process whereby advanced prototypes could be turned into deliverable systems
- At the time of writing, all the contract authors now are making use of the workbook editing tool - some a little more enthusiastically than others!

Once this process was under way, prototype workbooks were distributed amongst the other contract authors and then examined critically, and at length, at team meetings. Some of the early prototypes gave the team a strong sense of what it did not want the workbooks to look like. As a result of discussion and feedback, alterations and refinements were made. Over time, prototypes tended to promote a more positive response from other authors and, in due course, something of a modus operandi did indeed emerge within the contract team.

As know-how on workbook construction was acquired, it was catalogued into lists of page types and content types. These lists were then shared amongst other contract authors to try to encourage variety and subtlety of approach. Variety in particular was seen as a cardinal virtue. It was felt that it had a central role to play in grabbing and keeping the attention of students and thereby improving student motivation and enhancing the memorability of the workbook contents. Besides sharing them amongst the authors, the catalogues of techniques were fed back into the development of the workbook editing tool and the ultimate delivery software.

3. *Page Types*

We will turn now to our catalogue of page types. We identified three groups of pages that we wanted to have available to us. These were:

- Multiple choice pages
- Free-form answer pages
- Framework pages

We will start with our list of multiple-choice page types. In a computing context, multiple choice had a major advantage. A computer finds it difficult to assess and respond to input unless it already knows the precise answer that it should be looking for. Because multiple choice questions strictly limit the range of answers that can be given by students, the computer can be told all possible answers and can be instructed on how to respond to each different answer entered. On the other hand, multiple choice has some severe educational limitations that we discuss below. To compound these limitations, multiple choice has often been used rather unimaginatively by law courseware developers in the past ((Burris, 1987). There are, in fact, many possible multiple choice formats (Wilson, 1993). We resolved to make use of this wide variety, and, if possible, to widen it further by encouraging students to manipulate objects on screen - an approach that the Windows interface facilitates. The following is a catalogue of the multiple-choice question types that we have identified and used:

- Boolean questions (e.g. "Indicate whether your answer is yes or no." "Select one of the following items as the correct answer.")
- Single-dimensional tables (e.g. "Select all items from the column that are correct.")
- Multi-dimensional tables (e.g. "Select all the items in each of the columns that are correct. Then compare the contents of each column with the contents of the other columns.")
- Scale questions (e.g. "Move the scroll bar to the appropriate position.")
- Mix-and-match questions (e.g. "Draw lines linking the fact situations to the relevant issues.")
- Highlighting questions (e.g. "Underline the relevant part of this passage.")
- Sorting questions (e.g. "Drag the items into the appropriate category boxes.")
- Ranking questions (e.g. "Rearrange the items in descending order of importance.")
- Word-insertion questions (e.g. "Drag the appropriate words into the spaces in this passage.")
- Flow-chart completion/correction questions (e.g. "Draw the missing yes/no lines onto the

chart." "Drag the question boxes that are in the wrong places into the correct places on the chart.")

As we have said, excessive reliance on multiple choice questions has been criticised as educationally too restricting. Emphasis is placed on recognition rather than recall, and students are given no opportunity to formulate and express their own ideas (Allen and Robinson, 1992). The answer is to provide students with frequent opportunities to input freeform answers. But difficulties arise when one tries to preprogram the computer to recognise and respond to such answers. Readers that have experimented with computer-based adventure games (purely for research purposes, of course!) will be familiar with the possibilities and limitations of using 'parsing' techniques to recognise user input. In essence, the machine is restricted to recognising a few appropriate words or phrases and simply gives up if the user strays beyond its modest vocabulary.

We were content to use short freeform question types (e.g. "Type in a word/phrase by way of your answer." "Type the appropriate word into each cell of the table.") to escape from an excessive reliance upon multiple choice. However, we wanted more than this. We wanted to enable students to input long freeform answers (e.g. "Type in all the advantages and disadvantages that occur to you." "Draft a suitable contract term to cover this possibility."). Needless-to-say, such input would extend far beyond the parsing capabilities of today's computers. How could we escape this technological limitation? Taking or emailing such answers to a tutor or to fellow tutees for discussion and assessment was one idea. But we still felt that there were virtues in involving the computer in the process. After some thought, we came upon the idea of using student self-assessment together with this type of question. When a student indicated that s/he had finished entering an answer, the computer would respond with e.g. "Compare your answer with the model answer that I have now revealed. Now use the scroll bar to indicate how well you think that you have done." In essence, the student and the computer would, in partnership, be able to attempt to assess the quality of a long freeform answer.

Lastly we identified a page-type that we labelled framework pages. This type was, in essence, any page that did not contain a question requiring a response from the student. Such pages might contain:

- Introductory materials
- Explanations and clarifications
- Conclusions and summaries
- Rhetorical questions
- 'Toys' - e.g. animated diagrams and other graphics that did not, in themselves, amount to formal exercises
- Mapping materials designed to tell students where they were within a workbook or within the contract courseware

4. Informational Contents

We now turn to the informational contents of our workbooks. Needless to-say, the primary requirement was that the contents of the workbooks had to be well thought-out, clearly expressed, and relevant. No amount of technological massaging could make up for poor-quality materials. In addition, to this primary requirement, we decided that we wanted to focus on ensuring that the contents themselves were both motivating and memorable. Consequently, we sought to put together a catalogue of techniques that tended to make the contents more stimulating. These techniques included:

- Humour: of self-evident value albeit too easily overused
- Caricature: using exaggerated characters and situations e.g. 'Arthur Daley' type dealers and gangsters taking contracts out on opponents
- Surprise: introducing unexpected images e.g. the use of extracts from 'The Merchant of

Venice' to set the scene for a discussion on agreed remedies
- Symbolism: using a device or expression regularly to stand for an idea e.g. a red pointing hand to represent the presence of a particularly onerous or unusual contract term
- Role play: inviting students to adopt the perspective of, and play the part of, e.g. a judge, a City solicitor, a law centre lawyer or one of the parties to a contract
- Personal relevance: relating aspects of contract law to experiences that students might themselves have had e.g. buying defective goods from a shop or answering questions about an insurance proposal

Feedback was another aspect of contents that we focused on. We accepted that informative and timely feedback was essential to developing a rich and worthwhile interaction between student and machine. Feedback would be in three standard forms:

- A statement identifying the preferred answer
- A brief explanation of why the author agreed with the answer and also, perhaps his grounds for holding that the other answers were wrong

- A score based on a student's performance in each exercise.

Generally, it seemed to us, feedback ought to be provided as an instant response to students' answer. There were, though, circumstances where feedback might be delayed. Examples included:

Where students were given one or more tries at answering a question. Feedback would then only be given after the number of tries was exhausted or when a student hit upon the preferred answer

Where, in response to a student's answer, the courseware took a route along a remedial branch. Here, it would sometimes be inappropriate to give a student full (or any) feedback until the remedial branch rejoined the 'main line'.

How Will Courseware be Received in Law Schools?

Educational Implementation Issues

1. Courseware or Coursewares

The Consortium has settled on a development plan that will result in the delivery to Law Schools of seven sets of courseware in contract law, criminal law, tort law, EC law, property law, constitutional and administrative law and law for non-lawyers. Each program will run under identical software, have the same look and feel, and permit students to move between workbooks and resource books of different program in the courseware. Thus the objective is to provide homogeneous programs, so that once the student is familiar with using one program they should happily be able to use them all. Thus, although students will need to invest a little time (and universities a little time and money) in learning to use Windows and the Courseware, it should be a good investment.

2. Role in the Curriculum

The objective of those developing the contract courseware is not to replace small or large group teaching. The idea we have is that students might spend between one and two hours a fortnight using the contract courseware, perhaps in support of fortnightly small group meetings. We believe that some learning processes are more easily achieved using the computer, and furthermore that students will have a good deal of choice about how they use the programs and how rapidly they work through them. In particular we think that the hypertext aspect of courseware will make it easier for students to make links between disparate material relating, for example, to context, legislative history, legislation, case law and economic or social impact. In some institutions we anticipate that students

may have a room booked for them where they will work together in a regular fortnightly slot, in others, students will find a machine at their leisure and work on their own. We have not yet fully addressed the question of incorporation of communication capacity in the courseware (for example email or conferencing) and the potential this has for linking lone students with each other and with the tutor while working through the courseware. A major advantage of the courseware is that it will be delivered with its own library of cases and materials, the resource book and so has the potential to take some pressure off hard-pressed library resources. -

3. Are Law Schools Ready for Courseware? (Will Courseware be Ready for Law Schools?)

This is a question that will be central to the success or failure of the courseware initiative. Will law schools welcome the new learning resource or will they reject it as not relevant to them? A central aspect of the Consortium's strategy has been to involve as many academics from as many law schools as possible in the authoring process, thus giving many law schools some experience and knowledge in relation to the developing the courseware. But the commitment to courseware will need to be seen throughout law schools, and particularly among heads of law schools, for many of whom the use of IT in teaching will represent a profound cultural change. Courseware may, of course, be rejected on grounds that it is not educationally sound and therefore not useful. The Consortium will want to ensure that all institutions at least evaluate the soundness of the courseware and do not reject it for any other reasons.

Technological Implementation Issues

1. Hardware and Networking

Implementation of the Consortium courseware will require that students and staff have access to sufficient numbers of PC-compatible 486 computers with at least 4 MB of memory and connected to a very large file server. The last detailed information on the provision of hardware and networking of machines in Law Schools was provided in the Jackson Report (Jackson, 1991). The impression is given that since then many more institutions have moved towards Local Areas Networks (LANs) and that hardware is being upgraded.

Whether law schools will be ready in hardware terms will depend partly on whether they are aware in time that courseware is coming and what the requirements are. IT is the only area of HEFC funding which is not subject to the rolling programme of 3% efficiency gains, and the optimist might assume that the HEFCs will want to ensure the success of the TLTP by ensuring that sufficient hardware is available to utilise its products. Traditionally law schools have not been good at claiming a good slice of universities' IT pie. Heads of law schools will need to become more greedy!

2. Accommodation

For many law schools it may be difficult to find room for accessing the new hardware. What are the requirements likely to be? If we assumed a law school with 120 students in each of three years, we might anticipate that in the first year students would take contract1 property and criminal law, using courseware two hours a fortnight in each course. This would require three hours access a week per student. Assuming an IT room with twenty computers in it, this would work out at 18 hours per week of use for that room. If we add a similar calculation for second year students whom we assume to be taking criminal law, EC law and tort law, this doubles to 36 hours per week of use. Such 'back of envelope' calculations suggest therefore that an IT room with twenty work stations, and machine:student ratio of 1:15, might be in use all the time to accommodate courseware in a typical law school. Given the other demands on IT rooms for learning and using LEXIS, expert systems, word processing, email etc., it seems clear that one IT room would not be enough and that the machine:student ratio probably needs to be closer to 1:10 or better.

3. Support Issues

The discussion of accommodation (above) assumes a model of IT provision in which IT is a law school or departmental responsibility. In some institutions law schools have virtually total responsibility for all information and IT services including the library. In others, all such facilities are centrally provided and supported. Many institutions occupy middle ground. The major advantage of the departmental model of provision is that it can be proactive and tailored to the needs of a law school. All too often, however, proper support is not provided and it falls upon the shoulders of an interested academic to do much of the work that should be done by IT support staff. Where this is the case, the introduction of courseware will place further strain on those departments (and individuals) where support is not properly funded. Will academic staff want to train all the students in use of Windows and courseware, and/or be on call when the software goes wrong or machines crash? The disadvantage of the centralised model is that it often leaves law schools without in-house expertise and with little control over the way that IT is provided and supported for students. This model too will come under pressure with the introduction of courseware, as central IT services will need to ensure adequate provision of hardware, training and support for students. Hybrid models may have the strengths or weaknesses of either the departmental or centralised model. Whichever model is in place those responsible for its operation will need to ensure that it will work properly under the new pressures which courseware will present.

Conclusion: Towards A Third Generation?

We claim that the contract courseware team has contributed to moving law courseware forward a generation in three main ways. First, we have sought to apply the body of modern educational theory to the development of good quality courseware. Secondly, we have acquired, catalogued and shared know-how on:

- Modelling law courseware
- Creating varied and more sophisticated student/computer interactions

- Improving the quality and impact of informational content.

Finally, we have sought to a make use of some suggestions made by Allen and Robinson in their 'wish list' (Allen and Robinson, 1992) to improve the quality of our courseware. In particular, we have:

- Selected a simple multilinear structure that allows for the inclusion of remedial and advanced branches

Directly linked our interactive workbooks to a purpose-built, hypertext resource book of cases and other relevant materials

Enriched the range of multiple choice types on offer to authors

Found a way to make the computer respond in a useful way to long freeform answers by harnessing a self-assessment approach.

Given the primary aim of the Consortium to produce deliverable courseware by a deadline and within a limited budget (Law Courseware Consortium, 1992), this is as far as we have been able to go. Future courseware teams will, undoubtedly produce more subtle and sophisticated multilinear structures, a richer collection of interaction types, better use of the Windows interface and more imaginative use of the multimedia capabilities that are being built into the courseware. At this point, courseware will be ready to leap forward again to a new generation. The third generation will be characterised by widespread use of simulation, interactive video and even, perhaps, modest natural

language recognition. This will become possible because the appropriate technologies will become cheap, readily available, and easy to use. By then, we confidently predict that law courseware will be as addictive as computer games are today!

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