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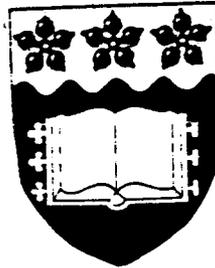
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UNIVERSITY OF WOLLONGONG
DEPARTMENT OF ACCOUNTANCY



SOFTWARE DEVELOPMENT IN ACCOUNTING
EDUCATION

by

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SOFTWARE DEVELOPMENT IN ACCOUNTING EDUCATION

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Department of Accountancy**

Abstract

The Accountancy profession, like many other disciplines, is being influenced by rapid developments in computer hardware and software. It is, therefore, essential that accountancy students become proficient in the adaptation of information technology techniques to accounting specific applications.

To achieve this Computer Aided Learning software has been developed to supplement the traditional teaching approaches of lectures, tutorials and textbooks. The programs are developed to familiarise students with the use of computers and at the same time encourage their enthusiasm to learn by using menu driven programs incorporating graphics, sound, animation and windowing.

Special software has also been developed to provide students with practical experience in computerised accounting procedures including the use of macro driven spreadsheets for the preparation of financial statements. This software provides students with a simulation of accounting practices currently in use in the business sector.

The logical extension of this was the development of an automated assignment assessment program. Assignments are submitted on floppy disk and are marked automatically by the assessment program.

Introduction

Computers are the way of the future. They are becoming more and more a feature of the business environment as even small business is taking advantage of the benefits of computers. Accountants, including auditors must be proficient in the use of computer packages particularly accounting specific applications eg spreadsheets used in the preparation of financial statements and accounting application packages.

Employers may not yet be demanding specific computer accounting skills as on the job training is often provided. However, the time is approaching when accounting specific skills may well be mandatory. As the supply of accountants gradually exceeds the demand, it is likely that graduates with computer skills will be preferred over those without such skills.

Therefore, university training should incorporate not only general computer applications but also accounting specific applications.

With this in mind, the Department of Accountancy at the University of Wollongong has taken positive steps to adapt information technology techniques to its teaching programs. We have concentrated on two areas Computer Aided Learning (CAL) and Computer Managed Learning (CML).

Computer Aided Learning

Initially CAL programs were developed for particular topics such as the basic principles of accounting, journal entries, consolidation of group accounts, assignment preparation and use of the library facilities. The programs included worked examples and quizzes. The aim of the programs was to give students an introduction to computers and at the same time an understanding of specific accounting topics.

The next step was the introduction of CAL programs for an entire subject by topic. Programs have been developed for first and second year accounting and second year subjects such as Financial Accounting, Information Systems and Business Finance. All the programs are menu driven for ease of use as many students have little or no computer training. Students work through topics at their own pace. The aim of these programs is to supplement lectures, tutorials, workshops and other traditional forms of learning.

Computer Managed Learning

To simulate the work environment students will experience in a commercial setting, students are given assignments requiring the use of spreadsheets in an accounting situation including preparation of journal entries, ledger accounts, worksheets, financial

statements and analysis of financial ratios. This gives students a further opportunity to develop both computer and accounting skills.

Large student numbers, on average 700 in first year accounting and up to 500 in some second year subjects, and progressive assignment assessment required to aid and improve the learning process have placed additional strain on subject resources. This led to a logical extension of the assignment software to include automated assignment assessment.

This allowed full capacity use of the computers and a reduction of the time spent marking by lecturers and thereby more time for research. It is estimated that an assignment which would take approximately 20 minutes to mark manually can now be marked in 2 minutes. Consider a subject in which some 400 students are enrolled. To mark an assignment manually for this subject would take approximately 133 hours. We can now mark the same assignment in 13 hours a saving of 120 hours. Another advantage of marking by computer is the amount of paper saved. Normally the student would hand-in a hard-copy of their assignment to be marked manually. Now they simply submit a disk.

Development Strategies for CAL

A four stage process for CAL software development has evolved. [Figure 1] This process, which includes a software shell, is appropriate for the development of CAL in a wide range of teaching and training areas. [Figure 2 next page]

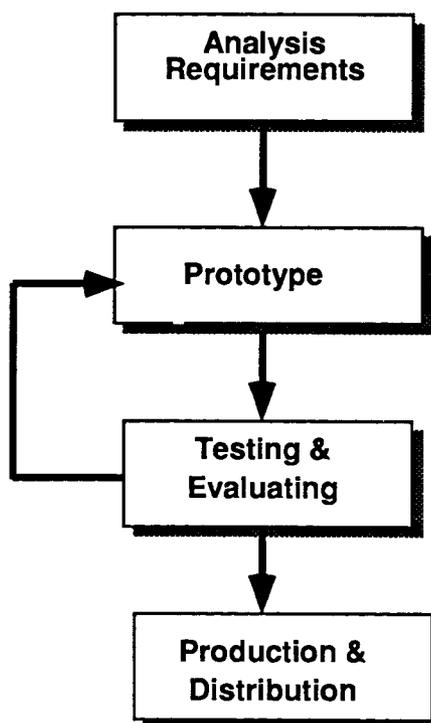


Figure 1

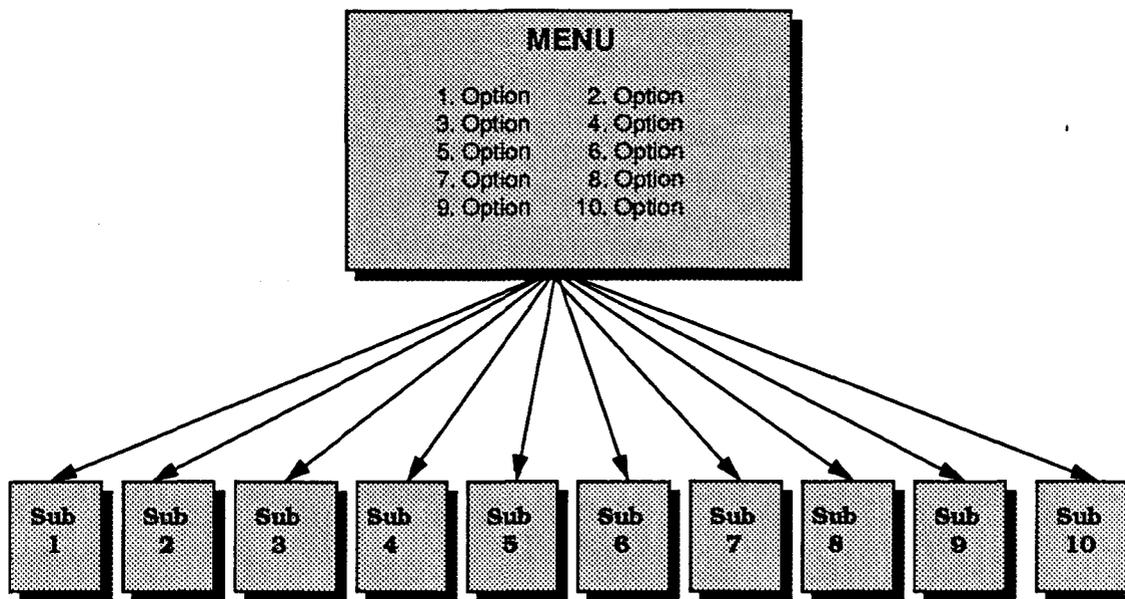


Figure 2 Software Shell

Stage-1 Subject Analysis

During this stage of development the lecturer involved in teaching the subject is interviewed by the departments computer systems officer to determine the structure of topics. These topics will become options on a menu and the basis for CAL software. The next step is to decide the main points the lecturer would like to present under each topic. This information is taken from lecture notes and presented in summary form. The concept is to supplement the lectures and reinforce the important points needed for students to understand the topic whilst not duplicating the lecture material. Once the menu options are complete and the subject matter decided on, the next step is to determine which information will be used as a base for quizzes.

Stage-2 Prototype Development

During the prototyping stage, the computer systems officer enters all the information gathered during stage-1 into a pre-designed software shell. [Figure 2] The shell is comprised of a dummy menu linked to empty sub-programs with quiz options. Each topic becomes an option on the menu and the summary information under each topic is entered into sub-programs where quizzes are included. Once the information is entered into the shell and the program is running correctly, the next step is the inclusion of enhancements in the form of pop-up windows, hot keys, animation, colour coordination and graphics. The prototype now proceeds into an assessment and modification process whereby the lecturer and computer systems officer work together until a final result is achieved.

Stage-3 Testing and Evaluation

During stage-3 the software is handed over to members of staff not involved in its inception to allow for an independent evaluation. Any modifications suggested by staff are considered by the lecturer involved, if the lecturer decides to include the modifications the software returns to stage 2. Once the software has passed the independent evaluation it undergoes a major hardware and software testing procedure. Firstly, it is tested in a networking environment under various network configurations and systems software. Next it is tested on several brands of stand-alone PC's and lap-tops.

Stage-4 Production and Distribution

Once the software is exhaustively tested it moves into the production and distribution stage. The Department of Accountancy uses a specially designed software copying machine which produces multiple copies of software in a matter of minutes. The machine is loaded with unformatted disks and the software master is read into memory, the machine then formats, copies and verifies each piece of software. The software is then labelled using our own software labelling program that produces multiple copies of labels. Each label includes the title of the software, instructions on its use and headings for student name, student number and tutorial group. Finally, it is distributed to students during their computer tutorial classes.

Development Strategies for

CML

A six stage process for CML utilising spreadsheet software is being applied.

This process is suited to any application requiring the development of a spreadsheet for teaching purposes and the subsequent marking of that particular spreadsheet by computer. [Figure 3]

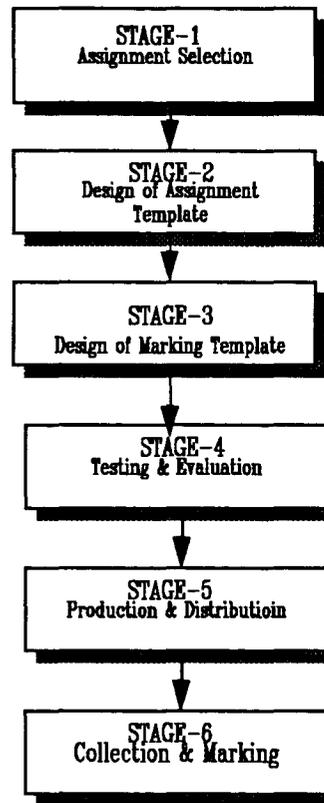


Figure 3

Stage-1 Assignment Selection

During this stage an assignment is chosen to simulate the expected work environment after graduation. Assignments are specifically designed for completion using a spreadsheet package. In our particular discipline we include the accounting procedures such as record keeping and preparation of financial statements including consolidation of the accounts of holding companies and their subsidiaries.

Stage-2 Design of Assignment Template

This requires the completion of the assignment question using a spreadsheet in order to determine the appropriate layout. Once completed the spreadsheet is subsequently broken down into components that will become options on a macro driven menu. Next, all numerical cells are replaced with zeros and cells containing formula are replaced with a highlighted label indicating formula is required. Finally, all headings are left in place and their cells protected.

Stage-3 Design of Marking Template

The marking template is completely separate from the template distributed to students. It consists of a series of macros specifically designed to search for the correct answers in the students completed assignment. To ensure the students are using formula and not merely typing in their answers the marking program looks for formula as well as a numerical answer. Each correct answer encountered by the marking program is added to a progressive score, the final score is written to the students disk and printed on hard-copy for lecturers records.

Stage-4 Testing and Evaluation

Evaluation of CML software is similar to that of CAL, it is also handed over to staff for an independent evaluation and if modifications are called for it returns to stage-2. The testing procedure also follows the same lines as CAL software. It must be tested on networks, stand-alone PC's and lap-tops.

Stage-5 Production and Distribution

Again, production and distribution are similar to CAL. The department's copying machine is used to produce multiple copies which are labelled and distributed to students during their computer tutorial classes.

Stage-6 Collection & Marking

When assignments are completed the disks are collected during tutorials and marked by an isolated system set up for this specific purpose. The reason the system is isolated is to ensure viruses do not contaminate other computers within the Department. We have found viruses a major problem on campus and have found it to be in our best interest to use detection, removal and prevention techniques. Our protection is in the form of a memory resident program which alerts the operator to any known viruses trying to attack the system. If any are found they are removed by activating software which locates and removes them. Both these devices will work on known viruses, however new viruses are emerging continually. Therefore, we have found it necessary to lock the marking systems hard-disk to prevent any unknown virus contamination. The locking device only allows read access.

To activate the marking system the staff type MARK. A menu appears with four options. The operator chooses option 1 which locks the hard-disk. Next, the spreadsheet package is loaded by choosing option 2. The operator marks each student's disk by activating a combination of keys. When all disks have been marked they are returned to students during their next computer tutorial session. During marking any disk found to contain a virus is set aside. These disks are scanned using option 3 which removes all known viruses. Option 4 allows the operator to exit.

Attributes of CAL

Computer enhanced attributes are an important part of CAL software. Therefore, we have incorporated many built-in enhancements to keep the students attention and at the same time educate them.

Access to Program

The first and foremost attribute in any software is its ease of use. The KISS principle has therefore been utilized owing to the varying levels of students expertise and computer literacy. For example, to run the program the student simply types GO. Ease of use is also available within the program in the form of hot keys. For example, function keys are used to quit, return to the menu or look at a previous screen at any time.

Menu and Introduction

After typing GO a menu is displayed containing options for each topic in a subject as well as an introduction. The introduction screen demonstrates the expected layout and allows students to experiment with the hot keys. When the student has completed the introduction they are returned to the menu. There are two main reasons for using menus in our software. Firstly, students find menus easy to understand and follow. Secondly, modification of existing sub-programs as well as additions are easily implemented.

Title Screens

Title screens are used to introduce each topic and to let the student know they have chosen the correct topic. Each screen is enhanced using a graphics package which allows a combination of colour, shapes and animation. Using these techniques the presentation draws the students attention to what is about to follow. For example, the topic "Reorganisation" uses colour and animates two characters walking across the screen.

Topic Screens

All topics are presented using a paging technique similar to turning the pages of a book. For example, the student reads the information provided and presses return when they are finished, this allows the next page to be presented. By using the paging technique each student can progress at their own pace. As well as paging we also use a combination of colour and highlighting to break the information presented down and to draw the students attention to important points.

Student Interaction

To give the student the feeling of personal attention we have them enter their name at the start. This allows interaction between the student and the system. For example, when the student has finished the topic they take a quiz. If their answer is correct a message appears such as "Great Sue you have the right answer". On the other hand, if they enter an incorrect answer a hint window appears with important points they may have missed. This will allow them to answer correctly the next time they attempt the question.

Score Evaluation

On completion of the quiz a score evaluation screen is displayed. For example, "Congratulations Sue your score is 4 out of 5 you can proceed to topic 4". If the student receives a low score they cannot proceed to the next topic. Their message would be "Sue, your score is 2 out of 5 try this topic again and take notes as you go. Good Luck" It is important that the student does not continue to the next topic as subsequent topics rely on a good understanding of previously presented material.

Post -Implementation Evaluation & Review

Impact on Subject Results

It is too early to clearly determine the impact of CAL and CML packages on accounting education in our department. Intensive use of these forms of teaching is relatively recent and programs are still in the process of modification and improvement. However, in our second year subject in which these methods were extensively used, the overall results showed a marked increase in the pass rate compared with prior years. Of course it is not possible to state conclusively that the introduction of extensive use of CAL and CML is responsible for this improvement. Nonetheless, the possibility cannot be discounted either.

Attitude of Students

Feedback from students has, in general, been favourable. They enjoy using CAL. It was easy and fun to use and they also found it a challenge to get a higher score than their fellow students. Student reaction to CML was also good. The introduction to topics and computer accounting skills provided by CAL helped students complete tasks similar to those expected to be encountered in their future work environments. Many appeared to believe that CML would give them an added advantage in the job market after graduation.

Improvements

Obviously all systems have flaws and ours is no exception. Students using empty cells in formula caused incorrect answers. Additionally, students who adjusted rows and columns received exceptionally low marks as the marking program could not locate all their answers. Another problem area is in the printing of a hard-copy result for staff. The spreadsheet package could not be modified to advance one line, it advanced 3 lines causing paper wastage. And, of course cheating in the form of copying another student's spreadsheet was also a problem.

Each of these problem areas have been investigated and resulted in the following solutions.

- a) locking the whole spreadsheet template,
- b) defining all cells needed to build formula numeric and
- c) warning that students copying will result in zero marks

Future Developments

CAL & CML

Due to the success of CAL and CML there are plans to produce a booklet to accompany disks prepared for one of the departments second year financial accounting subjects. This booklet is intended to serve as a prototype for a textbook and will serve as both a link to and complement the CAL and CML programs.

Teaching Innovation

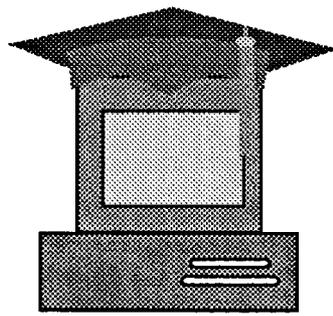
The Department of Accountancy is now going through a transition period. It is analysing the concept of teaching in a multimedia environment incorporating the latest technological advancements in video, animation, audio and graphical user interfaces. The Department is working towards combining traditional forms of teaching with technology to produce a quality teaching product.

To allow this to work we will be assembling our own transportable teaching system. The system will include a large-scale monitor to allow students attending seminars or tutorials to view the screen, a video attached via an outlet port to enable videos to be screened, an audio card to provide the best possible sound transmission and a colour data show for larger classes.

By using our transportable multimedia system, staff will have the ability to produce seminars, tutorials or lectures in their own office using the most up-to-date presentation software. Currently, staff produce overheads using a word-processing package.

Conclusion

It is the aim of the Department of Accountancy at Wollongong University to be at the fore-front of applying technology in a teaching domain. The success of CAL and CML has prompted the Department to continue to develop teaching software and move further into the realm of teaching using computer based technology



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