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Software Development in Accounting Education: Maximising Student and Academic Productivity Through Digital Technology

K. Cooper

University of Wollongong, kcooper@uow.edu.au

V. Coomb

University of Wollongong

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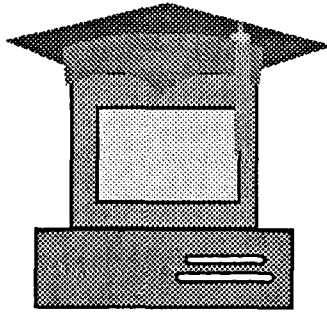
**SOFTWARE DEVELOPMENT IN ACCOUNTING
EDUCATION: MAXIMISING STUDENT AND
ACADEMIC PRODUCTIVITY THROUGH
DIGITAL TECHNOLOGY**

by

**Kathie Cooper & Vivienne Coomb
Department of Accountancy
University of Wollongong
Wollongong NSW, 2500 Australia**

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SOFTWARE DEVELOPMENT IN ACCOUNTING EDUCATION:
MAXIMISING STUDENT AND ACADEMIC PRODUCTIVITY
THROUGH DIGITAL TECHNOLOGY

Authors: Kathie Cooper & Vivienne Coomb

DEPARTMENT OF ACCOUNTANCY

UNIVERSITY OF WOLLONGONG

P.O.BOX 1144, WOLLONGONG, NSW,

AUSTRALIA. 2500

Telephone 042 213392

ABSTRACT

Increasingly sophisticated digital technology has provided a means to improve the quality of accounting graduates and the potential to reduce the amount of time required to assess student achievement. This paper outlines the approach adopted in the Department of Accountancy at the University of Wollongong to adapt digital technology to accounting education with the twin goals of producing high quality graduates equipped to participate in a rapidly changing technological environment and reduce the amount of marking time required by academic staff.

CAMAL

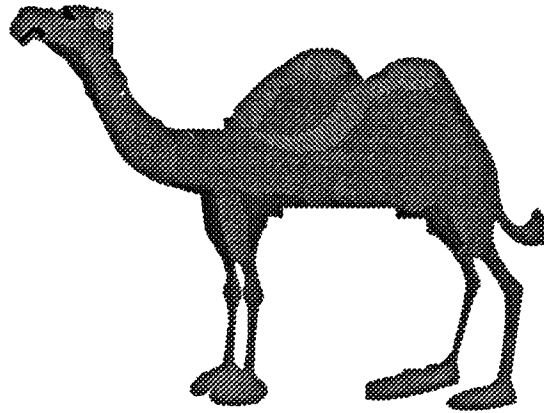


Figure 1

INTRODUCTION:

It is no longer sufficient for accounting graduates to be competent in traditional accountancy skills. With the advent of the micro-computer accounting is becoming increasingly oriented towards digital technologies. Accounting education should, therefore, follow this trend. Computer Aided and Managed Accounting Learning (CAMAL) is an approach whereby students are introduced to the use of computers in accounting in a user friendly way while also learning accounting.

CAMAL

CAMAL is a combination of Computer Aided Learning (CAL) and Computer Managed Learning (CML) which evolved from a need to give students an additional source of learning as well as a reduction in academic staff marking time. CAL and CML do not have to be linked, however, a logical combination of the two has been used successfully in the Department of Accountancy at the University of Wollongong.

Ideally, CAL should be used to complement and supplement the traditional learning modes of lectures, tutorials, computer laboratories and workshops. CAL should be simple and enjoyable to use and easily accessible so students can make maximum use of this learning aid. User friendly attributes such as batch files, menu driven programs and hot keys allow students with a minimum of computer expertise to use the programs with confidence. CML is more demanding in terms of both accounting and computing skills. The degree of accounting skill required depends upon what lecturers wish to test. Computer based assignments can, therefore, range from multiple choice, true or false type questions to detailed calculations, journal entries, worksheets and preparation of financial statements. User friendly attributes can be used, however, assignments should be designed so that students will learn the use of spreadsheets and mathematical formulae in completing the assignments. CML extends beyond benefits to the students in that the program can incorporate automated marking.

STRATEGIES FOR THE DEVELOPMENT OF CAMAL

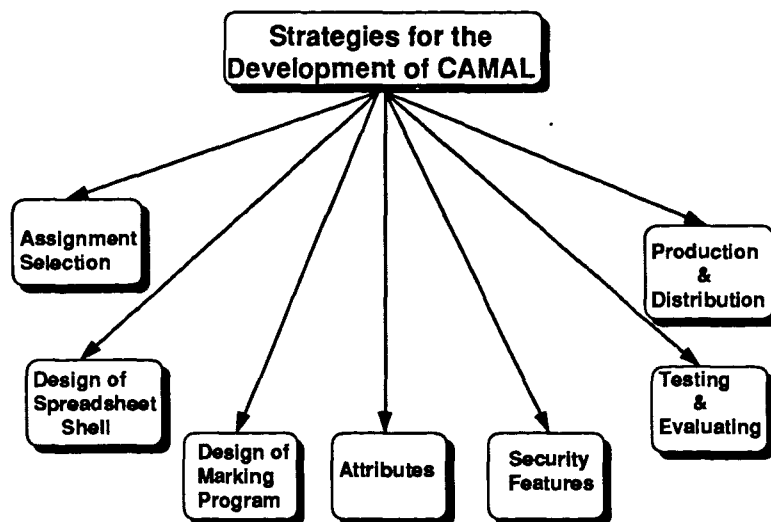


Figure 2

The following steps are undertaken in the development of CAMAL software. It should be noted that both the assignment and marking program are incorporated in a stand-alone package.

1. Assignment Selection

The first step is the selection of an assignment that not only simulates the students' future work environment but also makes maximum use of CAMAL. In other words, an assignment is chosen which allows a student to follow an accounting process through to the preparation of financial statements. This provides the more computer literate student with the opportunity to effectively build their own accounting package. For example, a consolidation question requiring the calculation of goodwill, journal entries in the books of the purchasing company to record the acquisition of a subsidiary, elimination entries, consolidation worksheet and preparation of consolidated financial statements will provide the students with the opportunity to acquire both accounting and computing skills. The more computer literate student can, with the addition of an appropriate command, post figures from the journal entries to the consolidation worksheet and, subsequently, consolidated results to the financial reports. Some computer software packages incorporate an on-line calculator.

2. Design of Spreadsheet Shell

The assignment is divided into logical components. Each component becomes an option in a macro-driven menu. A spreadsheet shell is created by allocating each component of the assignment to a specified section of the spreadsheet. Headings, columns and rows are locked and cells are numerically formatted where numbers and/or formulae are to be entered. In this way the assignment incorporates CAL by providing guidance on relevant accounting procedures at each stage of completion of the spreadsheet.

3. Design of the Marking Program - SPREADMARK 2000

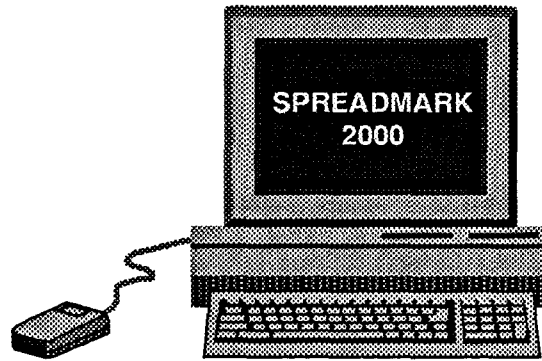


Figure 3

Obviously we do not wish to disclose complete details of our marking program. The following is an overview of the steps taken in this process. Initially marking criteria are identified and marks allocated accordingly. By combining high level and low level programming techniques with spreadsheet software, a worked solution to the assignment is used for comparison with students answers. A progressive score is maintained by the program for each component of the assignment.

4. Attributes

A range of attributes are added to the programs to facilitate learning and ease of use by both students and markers. Attributes include macro-driven menus on both assignment and marking programs. This allows students or markers to randomly select components of the assignment. Hot keys further enhance freedom of movement within the program by allowing users to return to a previous screen or main menu,

or quit the program. On-line content help is also available in the form of hints including references to related texts and CAL programs. For students requiring additional help with the use of spreadsheets, cells requiring formulae are highlighted.

5. Security Features

To prevent students copying the work of their fellow students or gaining access to the marking program, a number of security features are built into the CAMAL package.

(i) ANTI-CHEATING DEVICE

The first time the assignment program is activated, the student must enter their name and student number. The program will not allow them to continue until this step is completed. Once entered and work on the assignment commenced, the student name and number cannot be altered. On subsequent use of the program, this step is deleted. This means that one student cannot copy the work of another without detection by the marker. (Further details of this anti-cheating device are available on request).

(ii) PROTECTION OF MARKING PROGRAM

Access to the marking program requires the use of a password. This, of course, is standard practice. However, to discourage students from attempting to break the code by trial and error, the assignment file is deleted on the third attempt to enter the marking password.

(iii) PROTECTION OF PACKAGE

Protection of the entire package has two components. Firstly, menus are customized so that students only have access to those components relevant to completion of the assignment. This precludes tampering with macros and altering pre-set format.

Secondly, files are encrypted whereby changes cannot be made without the source code.

6. Testing and Evaluation

The software package undergoes extensive testing and evaluation in three areas: accuracy, compatibility and user-friendliness. The package is given to academic staff who have not been involved in its development and also postgraduate students for testing and evaluation of both the academic content and accuracy of the assignment. Those who are testing and evaluating the package also have a range of computer expertise so that an assessment of user-friendliness can be candidly made. Once satisfied as to the accuracy and user-friendliness of the package, it is then tested on a variety of personal computers (PC's), laptops and in networking environments.

On completion of the testing and evaluation procedures a master disk is prepared to be used as the source for the production of multiple copies to be made available to the students.

7. Production and Distribution

A multiple disk copying machine is used. The program is copied from the master disk to the memory of the copying machine. The master disk is stored in a safe place for future use and possible modifications. Blank disks, up to 55 at a time, are loaded into the copying machine which automatically formats, copies and verifies each disk. Faulty disks are rejected. Labels detailing subject title and with provision for student name, number and tutorial group are then produced using a specially designed program. Disks are labelled and distributed to students.

COLLECTION AND MARKING

Assignments are completed in weekly computer laboratories according to a pre-set timetable covering up to five weeks. Post graduate accountancy students supervise these laboratories providing computer assistance only. Assignments are completed and submitted on the CAMAL disk. The laboratory supervisors mark the assignments by entering a password which activates **SPREADMARK 2000**. **SPREADMARK 2000** automatically marks each component of the assignment and writes a progressive score to the student's disk. This obviates the necessity to post student results. The program also provides a printout of student name, number and result for lecturers records. It is anticipated that modification to the program will result in this information being written to a file. Disks are subsequently returned to the students in weekly computer laboratories.

BENEFITS OF CAMAL

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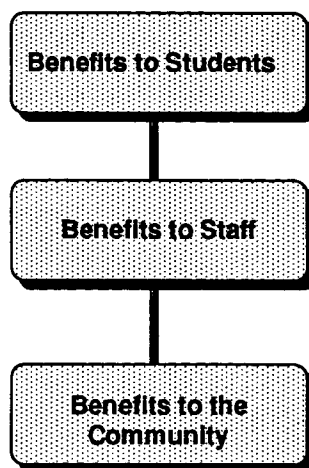


Figure 4

The potential benefits of CAMAL extend to both students and academic staff and to the community in general.

(i) BENEFITS TO STUDENTS

Students benefit from a broad-based accounting education which incorporates both accounting and accounting specific computer training. CAL, if thoughtfully designed, provides students with an additional means of learning accounting techniques and, when combined with CML (resulting in CAMAL) can be used to introduce students to progressively more sophisticated computer skills. As the importance of computers in the business environment increases, graduates with accounting specific computer training will have a competitive advantage in the employment market because employers will not be obliged to provide in-service computer training. CAMAL also has the potential to reduce the amount of time students spend seeking additional assistance from teaching staff. However, this benefit may not be achieved unless the content of CAMAL is restricted to topics and issues already introduced in lectures, tutorials and workshops. As already indicated, however, CAMAL should not duplicate materials presented in other learning modes. Ideally, CAMAL should provide students with assistance whenever and wherever they have access to a computer.

(ii) BENEFITS TO ACADEMIC STAFF

The benefits of CAMAL to academic staff will depend largely on the amount of thought put into its content and development. As suggested above, CAMAL has the potential to reduce the amount of time academic staff spend in assisting the student learning process outside formal classes. The greatest benefit, however, is in the reduction of marking time. Automated marking has been used successfully in one subject in the Department of Accountancy at the University of Wollongong. A

consolidation assignment prepared and submitted on disk by some 400 second year accounting students was marked by **SPREADMARK 2000** in 1991. It was estimated that marking of hard copies would have taken a minimum of 20 minutes per assignment. **SPREADMARK 2000** marked the same assignment in two minutes. With refinements, it is considered that this time will be reduced to half a minute. Writing student results to a file also saves time in the recording of marks.

(iii) BENEFITS TO THE COMMUNITY

At a time of increasing awareness of the value of trees to the world environment and future survival, a saving of paper must be considered a definite benefit to the community. As assignments are submitted on disk, students have no need to obtain a printout of their answers. When total numbers of students in all tertiary institutions are taken into consideration, the potential saving of paper and thus trees is substantial. Writing of results to disk also saves paper in that results no longer need to be posted. An additional benefit is that once the student has completed a particular course, they can re-format and use the CAMAL disk for other purposes.

The notion of saving paper in this manner may follow the student through to their working environment. Evidence (Hasan, p.267) suggests that students educated in the use of electronic media will be more likely to accept the transmission of information in this manner in their future work environment than those who have been educated using traditional communication mediums.

CONCLUSION

Our aim in using CAMAL is to maximise academic and student productivity through digital technology. Achievement of this purpose has already been reached in the marked reduction in time taken to assess student ability in the completion of detailed

computer-based accounting assignments and recording of results. This feat means that academic staff can now use the time previously spent marking more productively. The benefits to students cannot be readily assessed because the use of CAMAL in accounting education is relatively new. However, in a second year accountancy subject where CAL and CML were used extensively in 1991, there was a marked increase in pass rate. It is intended to undertake further studies to determine if this increase in pass rate is attributable to the use of CAMAL as a learning aid. Studies in other tertiary institutions in Australia (Queensland University of Technology and Griffith University) suggest that CAL is a valuable learning tool (Bryant and Bishop, p.55 and Winn, p.711). It is considered that the extension of CAL to include CML (CAMAL) will enhance the usefulness of this learning aid and help produce high quality accountancy graduates equipped to meet the demands of an increasingly automated business environment.

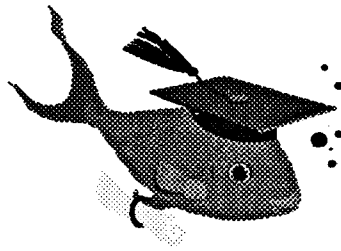


Figure 5

Our students are not considered
"fish out of water"
when it comes to applying technology
in a business environment.

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