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Integrating Computer Literacy and Communication Skills

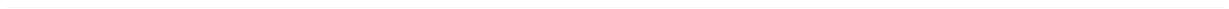
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ABSTRACT

Both computer literacy and communication skills are becoming increasingly important in academic life and beyond. However, although general 'literacy' courses may teach the basics of how to use word processors, spreadsheets and so on, students may never see the relevance of the techniques to their particular field of study and so may be unable to successfully transfer the skills they learn to the rest of their studies. This paper describes a practical solution to this problem, in the form of a print-based study module that integrates basic computing skills with communication and analysis skills that are widely applicable to many different fields of study.

INTRODUCTION

This paper describes the development of a study module that enables first year students at Murdoch University to utilise information technology to support communication and analysis skills. The study module integrates computing skills with learning skills that are widely applicable to many different fields of study. The module makes use of common end-user software to show how typical study tasks may be facilitated by information technology.

BACKGROUND

Employers regularly highlight the need for improved communication skills in new graduates and encourage universities to strengthen the emphasis on communication in their programmes of study (eg. Lewis & Ducharme, 1990; Atkins & Georgantzas, 1989; Department of Employment, Education and Training, 1990).

Computer literacy is also becoming increasingly important to universities. Computer literacy is commonly defined as a basic understanding of what a computer is and how it can be used as a resource. A computer literate person should be able to use a computer to produce the information they need and would be assumed to have some experience with common software packages such as word processing, spreadsheets and possibly databases. A survey of British University computer literacy courses identified these as the most commonly taught packages (Stephens & Rowland, 1993).

Employers demand computer literacy from the new graduates they employ (Lewis & Ducharme, 1990). Students themselves also recognise the necessity for achieving computer literacy. A survey of commencing students at Murdoch University in 1995 found that 96% of respondents believed that computer literacy skills are either essential or useful for success both at university and in their working lives (McGill & Hobbs, unpublished survey, February 1995).

Computer literacy and communication and analysis skills can enhance one another. A number of studies have suggested that the use of information technology can facilitate communication and analysis tasks. For example, Bangert-Drowns (1993), in a meta-analysis of 32 studies, reported that using word processing to teach writing improved the quality of student writing. Other researchers have reported that using word processing to teach writing can make students feel more positive about their writing (e.g. Roblyer, 1988; Rohde, 1993). In another study, Boye (1993) used spreadsheets to increase students' problem solving skills.

The recognition of the importance of computer literacy is reflected in the Murdoch University strategic plan which has as a stated objective 'that all graduates should be computer literate'. However, there is currently no guarantee that all students will take appropriate units to acquire these skills, or that the skills that they acquire will be relevant beyond the units in

which they are taught. The teaching of computer literacy units is commonly the responsibility of computer science and information systems departments and although such units may teach the basics of how to use word processors, spreadsheets and so on, students may never see the relevance of the techniques beyond the units in which they are taught. As a consequence, they may be unable to successfully transfer the skills they learn to the rest of their studies and more widely.

The aim of this project, therefore, was to develop an approach to teaching computer literacy skills that would be relevant to all students, so that they would be able to make effective use of these skills throughout their university career and beyond.

Research in student learning suggests that skills may be learnt more easily in a relevant context (Ramsden, 1988). One common thing that students do, regardless of their discipline, is study. We believe that integrating computing skills with learning and study tasks would have the advantage that the students would learn computing skills in a context that would be immediately relevant and useful to them, so they would be more motivated and likely to learn. For example, students could learn how word processing can be used not only to produce the final version of an essay, but also to facilitate the planning, drafting and revising stages. And, because the computing and learning skills would be useful on an ongoing basis (there is always an assignment to do!) students would take these skills with them into the rest of their studies.

THE MURDOCH CONTEXT

At Murdoch University, 'Foundation' units provide an ideal opportunity for integrating computer literacy skills with learning and study skills. At Murdoch, every student must take one of a number of interdisciplinary Foundation units in their first semester of study. These units are designed to introduce students to university study and to develop their academic learning skills of research, communication and critical analysis. Examples of Foundation units include: 'Australia and Its People' which looks at Australia and how Australian society operates and aims to encourage students to be analytical in their approach to life in Australia; and 'Foundations of Science and Technology' which discusses the origins, methods and applications of science and technology.

All Foundation units include a 'Learning Skills' component, which covers topics such how to plan and organise study time, how to define an essay topic and construct an essay, and basic numeracy. Although some of these tasks can readily be facilitated using information technology, prior to the start of this project the potential role of information technology in learning skills was not being exploited. This left us with an opportunity to address the need to introduce computer literacy in an appropriate context.

THE STUDY MODULE

SCOPE OF MODULE

Our aim in developing the study module 'Computer Literacy for Learning Skills' was not to teach students an exhaustive set of computer literacy skills, nor to attempt to apply computing to all the learning skills covered in Foundation units. Rather, we attempted to provide students with those basic computer skills that would enable them to perform typical learning and study tasks more effectively (see Figure 1), and show how they could be applied to these tasks. We hope that students, by seeing the usefulness of computer literacy for everyday study

tasks, will (in addition to making use of the skills presented in the module) be encouraged to explore and develop further their computer literacy skills.

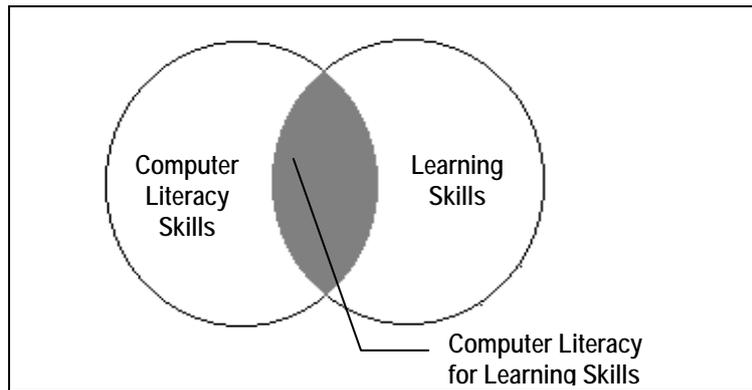


Figure 1. Scope of material covered in ‘Computer Literacy for Learning Skills’ module, shown as shaded area where computer literacy skills and learning skills overlap.

APPROACH

We developed ‘Computer Literacy for Learning Skills’ around a series of exercises which students work through, using examples of real study tasks. We considered this would be more effective than, for example, a reference book that simply presented techniques. The education literature suggests that adult learners often prefer to be active rather than passive learners, and tend to be task centred and problem centred (Ferenc & Vockell, 1994). Studies have shown that word processing instruction that focuses on real tasks is more effective than use of training manuals or unguided discovery (Carroll, 1988). Problem solving is also believed to be an effective approach to learning. For example, Charney et al (1990) found that learning by problem solving, with given goals, is more effective for novice users of spreadsheets than example copying, and unconstrained exploration. Where possible, therefore, our examples require students to adopt a problem solving perspective rather than to follow prescriptive steps.

CONSTRAINTS ON DESIGN

In designing the study module, we had to consider several constraints. Firstly, the module had to be useable in all of the Foundation units. This meant that the material used in examples and exercises had, as far as possible, to be relevant to all students. The examples we used included such topics as commuter transport profiles in Australia, kangaroo populations, expert systems for supermarkets and essays on the benefits of a university education; hopefully examples that would not overemphasise or exclude any particular discipline.

Secondly, we had to assume that the module would be used by students who had no computing background at all (although we expected that some students would have experience in the types of software used). We therefore chose to base the module on a relatively simple integrated package, Microsoft Works for Windows[®] (version 3.0). We felt this package would be straightforward to learn and the skills acquired could be transferred to other packages fairly readily. In addition, there was the practical consideration that, as Microsoft Works[®] is installed in the general computing laboratories, it was the only package to which we could assume all students had access. Using Microsoft Works[®] meant that we could not make use of some of the more sophisticated features that are available in other

packages: for example, outliners, tables or dedicated presentation software. However, we felt that our approach should be to emphasise general principles that could be applied with any software to which students had access, pointing out features in other packages where appropriate.

We were also constrained in how closely we could integrate the skills presented in the module with the learning skills taught in the Foundation unit. Although there is a learning skills component in every unit, there is no standard format, with each unit differing slightly in sequence, content and emphasis. We therefore had to try to ensure that the module complemented and reinforced all appropriate learning skills, while not being too closely tied to any particular unit.

Finally, the study module had to fit in with existing timetabling and resourcing in the Foundation unit. For example, we could not assume anything about the computing background of tutors who would be involved in teaching the unit. We therefore designed the module to be self-paced and self-contained. As adult learners are capable of being more self-reliant and self-directed (FERENCE & VOCKELL, 1994) we felt this to be an appropriate format.

STRUCTURE OF THE STUDY MODULE

The module has been designed to be as flexible as possible to take into account the different experience levels of students and different requirements of the various Foundation units. This has been achieved by structuring the module so that the sections that teach software skills are separate from those that focus on study tasks. Students can thus work through the sections in different sequences and on an 'as needs' basis.

The module is divided into two main parts. The first part, 'IT Basics', enables students to acquire the basic practical skills of word processing and spreadsheet use that are needed in the second part of the module, where these skills are applied to study tasks. The second part assumes competence in the use of the software package and demonstrates how the software can be used to facilitate the typical study tasks of essay writing, working with numeric data, preparing presentations and carrying out research projects. A practice disk containing files used in some of the exercises is supplied with the module.

An advantage of separating the practical computing skills from their application to study tasks is that students are not trying to learn two things at the same time: the message is not confused by learning 'which key to press' at the same time as learning the task. This separation also facilitates the future adaptation of the module to different software packages (e.g. Microsoft Office[®]) or different platforms (e.g. Macintosh[®]).

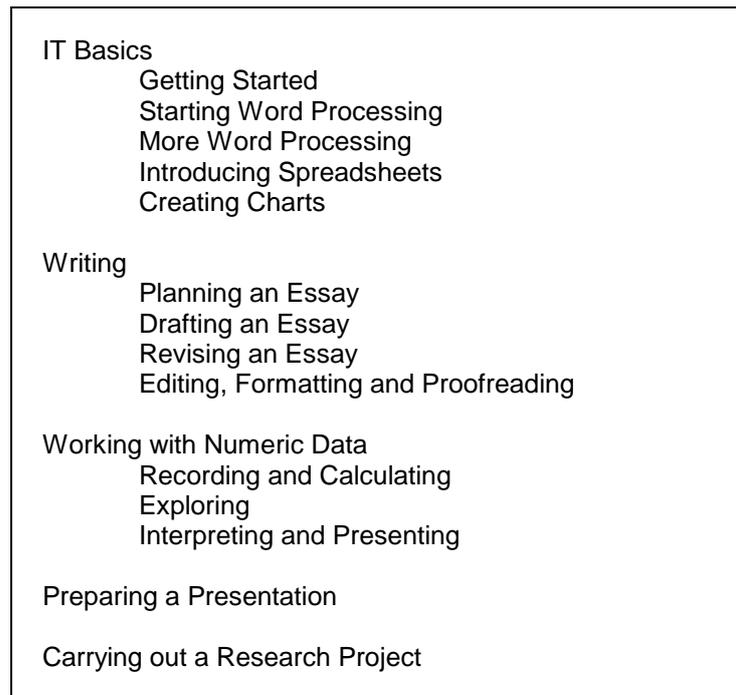


Figure 2. Structure of study module ‘Computer Literacy for Learning Skills’

There are five sections in IT Basics. Each section begins with a checklist of skills that are covered in that section. Students acquire these skills by working through a practice exercise that incorporates the different skills. Each skill is illustrated step by step, showing the appropriate menu commands or mouse actions, with pictures of screens at appropriate points (see Figure 3 for example). Review questions at the end of each section are included so that students can check their understanding of the material covered.

The first IT Basics section, ‘Getting Started’, uses online tutorials to introduce students to the Microsoft Windows[®] environment and to give them an overview of the Microsoft Works for Windows[®] package. The second and third sections cover the basic document handling skills of creating, saving, opening, closing and printing documents from the word processing tool, and entering, editing and formatting text. Copying a graphic from a document provided on the practice disk introduces the ideas of working with multiple windows and using graphics with text.

The two spreadsheet sections cover spreadsheet concepts, entering data and creating formulas, absolute and relative referencing, and charting. In the final exercise, a word processing document containing text, a spreadsheet table and a chart is created, demonstrating how the different software tools may be integrated.

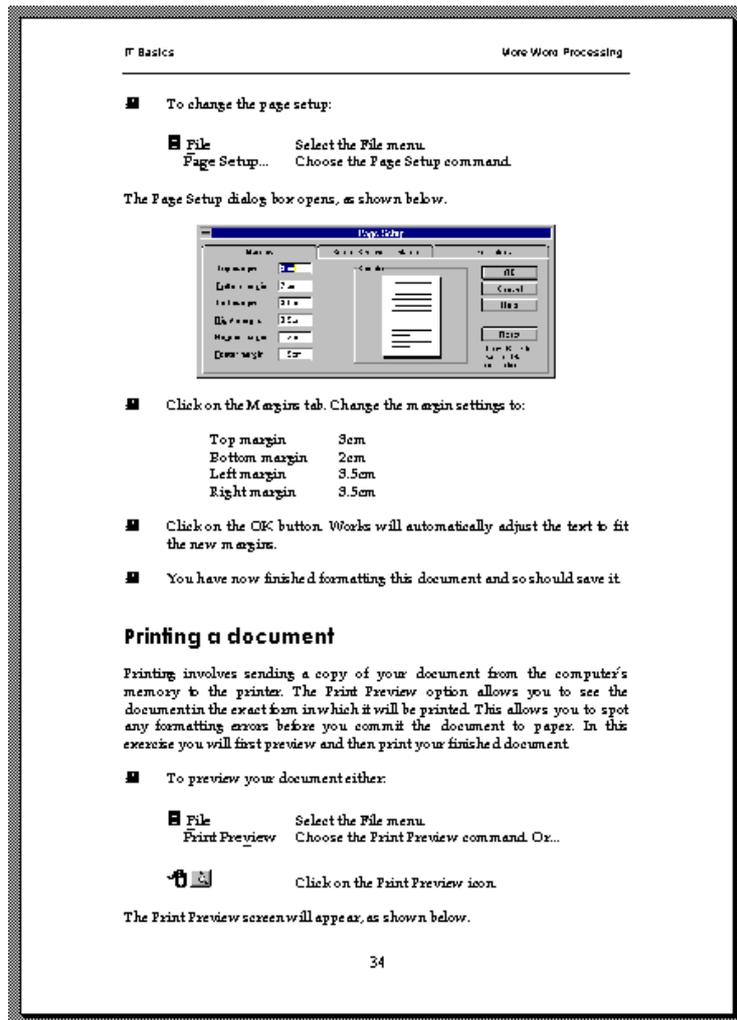


Figure 3. A typical page from IT Basics

In the remaining sections, the emphasis is on introducing simple practical techniques that facilitate study tasks, assuming that students have already acquired basic competence in the computing skills from the IT Basics sections, or from their prior experience. Students who are not familiar with Microsoft Works[®] complete the IT Basics sections before beginning the later sections. Students who have some experience in word processing or spreadsheets can check that they have all the skills required for a section by referring to a checklist at the start of the section ('To complete this section you need to know how to...'), which refers them to the relevant IT Basics section (see Figure 4).

As in the IT Basics sections, the techniques for study tasks are introduced through the use of examples and exercises. Where new word processing or spreadsheet skills need to be introduced, they are presented in the same manner as those in IT Basics. Review exercises are provided at the end of each section for additional practice. We tried not to be too prescriptive in presenting study techniques, suggesting alternative approaches where possible, referring to features available in other software packages, and recommending that students experiment and discover what suits them and their style of working.

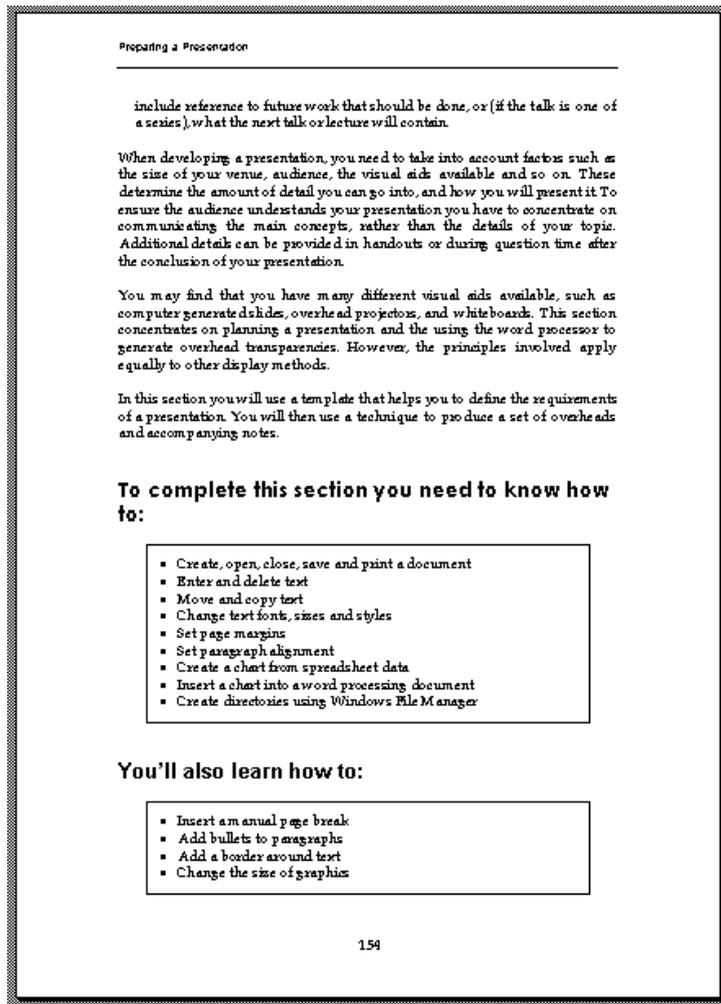


Figure 4. A page from 'Preparing a Presentation', showing the checklist of computing skills required to complete the section.

The sections on Writing take the students through the stages of essay writing: planning, drafting, revising, editing, formatting and proofreading; building on concepts that are covered in detail in the learning skills components of their Foundation units. In each of the stages students are introduced to word processing techniques that can facilitate the activity. For example, 'Planning an Essay' presents ideas for using a word processor to get started on an essay. In one exercise students develop a template document which contains prompts to help them generate ideas and notes about their essay content and approach. They then structure their rough notes into an essay outline by copying them into the appropriate position in a second template document, using tiled windows to view both documents simultaneously (see Figure 5).

In 'Drafting an Essay' students expand their essay outline into a first draft. Strikethrough is introduced as a way of marking text for later deletion, and suggestions are made for using different formatting conventions and 'note-its' to annotate a draft. In 'Revising an Essay' the emphasis is on encouraging students to revise the content and structure of their essay, rather than making superficial changes to formatting or layout. Students gain practice in structuring

an essay effectively, by experimenting with different sequencing of ideas by moving paragraphs of text. The articles used in these exercises are supplied on the practice disk.

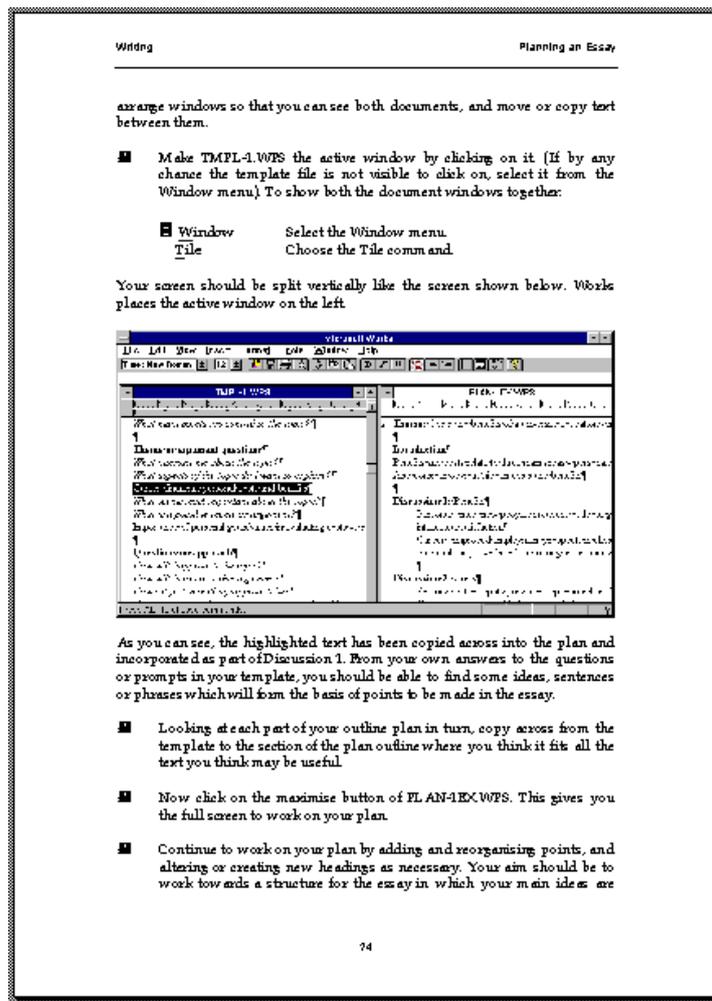


Figure 5. A page from ‘Planning an Essay’ which guides students through the steps to develop an essay outline

The final Writing section, ‘Editing, Formatting and Proofreading’, presents techniques that students can use in the final stages of polishing an essay and presenting it effectively. Several new commands are introduced in this section. Examples are used to show how the Thesaurus and Find and Replace commands can be used to highlight and make changes in writing style. The spelling checker is introduced and hints for proofreading word processed documents are presented. Finally some basic design principles, and the formatting techniques used to achieve them, are presented.

The sections on working with numeric data help students to recognise situations where a spreadsheet can be a useful tool in handling numeric information and lead them through developing and using spreadsheets for different purposes. The first section, ‘Recording and Calculating’, presents a set of data and some questions about it. Students then work through the stages of planning, constructing, and testing a spreadsheet based on the data set and use it

to answer the questions. 'Exploring' introduces the ideas of what if analysis and goal seeking, through an example based on athletes' weight changes related to food intake and exercise. Again students are encouraged to work out the formulas required, design the spreadsheet and devise their test data themselves, before possible solutions are presented.

'Interpreting and Presenting' looks at how charts can be used to explore trends and relationships in data and to present numerical information effectively. Students investigate a set of data (provided on the practice disk) by creating a number of charts from different subsets of the data. Skills introduced here include creating different chart types, defining the data series used, and altering axis scales. Questions are included throughout the example to encourage students to think about the interpretation of the charts as well as be able to generate them.

'Preparing a Presentation' uses simple word processing skills, emphasising the difference between written and spoken presentations. In the exercise students create a spoken presentation based on a magazine article provided in the module, but equally the stages could be followed to develop a presentation of the student's own. A template of questions, provided on the practice disk, helps the students to define the requirements of their presentation. They then plan, create and annotate a series of overhead transparencies by saving successive stages of an expanded plan and formatting appropriately. Skills introduced here include fixed page breaks to delimit each overhead, bullets, borders, and use of Print Preview to check the formatting. Other hints, such as the use of footers, page numbering and incorporating tables, charts and graphics, are covered.

'Carrying Out a Research Project' follows a different approach in having no exercises to work through, and instead highlights stages in the research process in which computing techniques are applicable and refers to the other sections as appropriate. Templates are included on the practice disk for writing a research report, based on the traditional scientific report format of Introduction, Methods, Results, Discussion and Conclusions, and for a simple spreadsheet scheduling technique.

The sections Writing, Working with Numeric Data and Preparing a Presentation can be completed in any order, as each only requires skills covered in IT Basics. This provides flexibility in adapting the module use to the requirements of different units and individual student needs.

TRIALING THE MODULE

The module was trialled in two Foundation units, Foundations of Science and Technology, and Australia and its People, in Semester 1, 1996. All students in the units were supplied with the module and practice disk. In Foundations of Science and Technology, the module was initially a compulsory part of the unit, but, following objections from students who claimed to be computer literate already, students were granted exemption by the unit coordinator if they undertook to submit their assignments in word processed form. In Australia and its People, the module was recommended to the students but was not compulsory. Both units had suggested schedules for the students to follow in working through the module, the schedule being tailored to the unit and the timing of assignments.

Students were expected to spend an average of one hour per week working through the module. They were able to use the general purpose computing laboratories, or their own computers if they had them. No formal classes were timetabled for using the module, but some support was provided in the form of a 'Help Desk' which was located next to the

computing labs and which was open for four hours a day. The help desk provided support only for problems related to the software package. Students were expected to take unit-related problems, such as discussing their essay structure or content, to their usual Foundation unit tutor.

At the end of semester students in both Australia and its People and Foundations of Science and Technology were surveyed to find out the level of usage of the module, and whether they found it useful.

RESULTS

The results are based on a response to the surveys of 29% in Australia and its People and 65% in Foundations of Science and Technology. The level of use was disappointingly low in both units. In Australia and its People, 10 out of the 47 students (21%) who responded to the survey used the module at least in part. In Foundations of Science and Technology, 36 out of the 71 students (51%) who responded to the survey used the module, of whom only 4 worked through the whole module.

The low level of use was due to a combination of factors. The most common reason given by students in both units was that they were already computer literate, and so did not need the module. It appears that these students did not differentiate between the skills presented in IT Basics (which they were already familiar with) and the techniques for writing and other study tasks, and had abandoned the module before getting as far as the study skills sections. Thus, although the module was designed to be used flexibly, this was not apparent to the students. More effective 'marketing' of the module, perhaps in tutorials, may have been necessary.

Other common reasons given by students in Australia and its People were that they did not have time and that the module was not compulsory. This was borne out by the usage of the different sections. Usage of the module appeared to drop off as semester progressed (and student workloads increased). Many students completed at least part of the IT Basics sections but did not progress to Writing or the other sections.

From comments by students and tutors in the units, we suspect that another reason the module was not used more extensively was because it was based on Microsoft Works, and many of the students had Microsoft Office on their home computers.

Despite the low overall use, students rating of the usefulness of the module was generally very positive. Many rated the sections they had used as Very Useful or Useful. Some typical comments included:

"Fantastic. I knew only how to turn on a computer pre the module. I would advise it (the module) for all foundation courses. Maybe even incorporate it into the course like the library assignment."

"I will probably use this more next semester. It has a very useful reference guide."

"Found it was great for anyone who was not computer literate, but boring if you already know what your [sic] doing, hence the failing to complete further parts."

"I think it is quite a good idea, very relevant especially for people not familiar with basic computer use."

"Thank you, it really helped me."

"Keep it going, maybe all foundation units should have it."

"Very useful study module for those students who are not computer literacy [sic]."

"The best parts of the module were the techniques for all areas. Please expand. ie. even computer literate, this is helpful."

“Excellent also to keep as a reference/templates! Excellent for foundation unit level.”

In the survey we asked if students were prepared to be surveyed again on their computer usage next semester. We will attempt to follow up students who have used the module, to find out whether students take the skills and techniques they have learned into subsequent units. We also intend to follow up students in the first year unit Introduction to Information Technology. The practical component of this unit teaches word processing, spreadsheets and databases, using the more conventional approach of teaching the skills only with, typically, business-related examples. We hypothesise that students who have used the study module are more likely to integrate information technology effectively into their study on an ongoing basis.

It has not been possible to attempt any evaluation of the quality of students’ communication skills when using the module, for example, comparing students who used the computer for planning and drafting their essay with those who used it only for the final copy. Our main focus was on using communication skills as an effective way to acquire computer literacy skills, rather than the reverse. In addition, as we were not directly involved in the units we did not have the opportunity to attempt such a comparison. Nevertheless, this is an interesting question which it may be possible to follow up in the future.

CONCLUSIONS

We have developed a study module that enables students to use simple word processing and spreadsheet skills to facilitate the common study tasks of essay writing, working with numeric data, project work and presentations. We felt that this integration of information technology skills with learning skills would prove to be an effective way of ensuring that students acquire basic, relevant, and transferable computer literacy skills.

Results from our preliminary trial suggest that the module needs to be more closely integrated with other units if it is to have widespread use. If it is seen as an ‘extra’ many students will not use it simply because they already have enough to do. Making a more obvious separation between the IT Basics and study skills sections may help in ensuring students focus on the study skills sections rather than repeating the basics unnecessarily. We have had some interest from staff at other institutions who intend to make it a formal part of their units, and we may be able to assess its effectiveness further in those situations.

The module itself has the potential to be developed further in a number of ways. It could include additional types of software: for example, databases could be used to promote information management skills, and electronic mail to show how collaborative work can be facilitated. Adapting the module to other software packages would be straightforward, as this would only require changes to the IT Basics sections with minor changes elsewhere. By including slightly more background about the study skills material the module could be used independently of the units in which these skills are explicitly taught. There is also the potential to tailor the module content more closely to particular units, by including additional examples relevant to each discipline.

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