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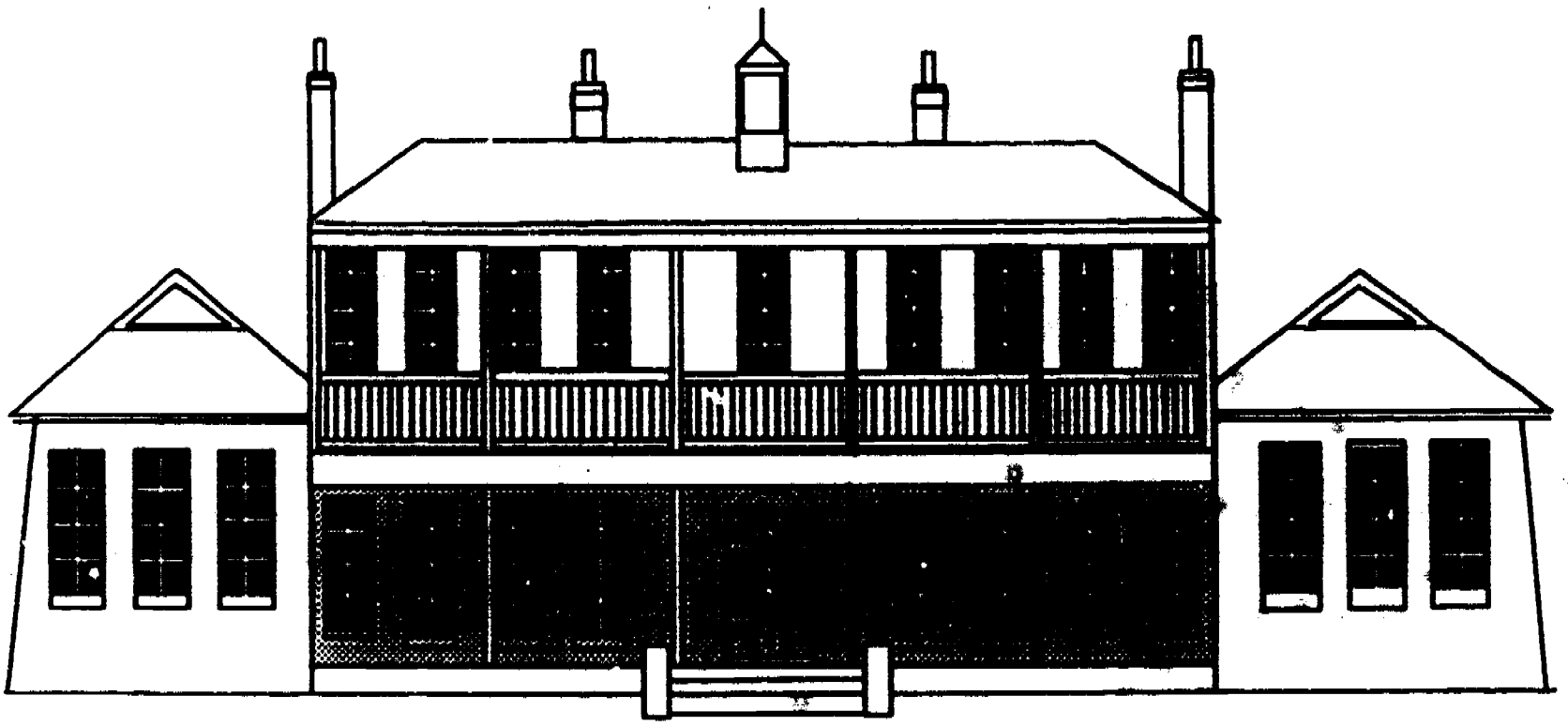
ABSTRACT

This publication is meant to share ideas about distance education and descriptions of work-in-progress in this area. In the first of three papers, "Computers, Related Devices and Distance Education: How Cinderella Becomes a Princess," George Hampton describes the need for technological literacy and suggests computer-assisted instruction and computer-managed instruction as means for achieving this end. A list of 33 references is provided. In the second paper, "Collaboration To Improve Access: A Case Study in the Provision of Continuing Education at a Distance," Gail Hart and Lynette Russell discuss the need for continuing education and professional development, and describe a project in nursing research in which three new instructional nursing courses were designed and implemented successfully. A list of 11 references is provided. In the final paper, "Opening Possibilities: How Distance Education Can Serve Small Organizations," Stephen Relf discusses continuing education and instructional design applications in the New South Wales Police Service, paying particular attention to textbook design and visual presentation of information. Four references are listed. (DB)

OCCASIONAL PAPERS IN DISTANCE EDUCATION

NUMBER 10

Charles Sturt University



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EDITORIAL COMMENT

This edition represents a continuation of an initiative which began in CSU-Riverina several years ago. The publication is meant to share ideas about distance education and descriptions of work-in-progress in this area. It has been used in the past as a trial for articles which have been further developed and published elsewhere. What makes this edition special is the fact that for the first time, all articles have emanated from CSU-Mitchell.

I am indebted to the authors and solicit further contributions from all campuses of the University.

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COMPUTERS, RELATED DEVICES AND DISTANCE EDUCATION: HOW CINDERELLA BECOMES A PRINCESS

George Hampton

> *As we approach the end of the twentieth century...we need a new kind of education...*
>
> *I am convinced that most educational services will be delivered electronically within a couple of decades.*
> (Knowles, Foreword to Hodgson, 1987, pp. v,vi).

Distance education has been called the "Cinderella of the education spectrum" (Keegan, 1990, p.3).

When the Open University was established in 1969, distance education lacked credibility in the United Kingdom.

The reaction to talks about the Open University:

> *to universities, adult education groups, and indeed, to any audience whatsoever was entirely predictable. There was at the beginning profound scepticism, garnished with ridicule and hostility; and by the end, if one was lucky, the garnish might have disappeared and the scepticism might be a little less profound* (Dodd, 1981, p.1).

Numerous arguments were marshalled to support the view that distance teaching would never work, or if it did, it would never be as good as conventional university teaching (Dodd, 1981, p. 2)

Of course it had worked in the past for other institutions. There is a much older and a widespread tradition of distance teaching in universities, preceding the establishment of the Open University (Rumble and Harry, 1982). Despite the fact that distance education is still usually ignored (Keegan, 1990, p. 4), it works.

Charles Sturt University (CSU) - Mitchell (previously Mitchell College of Advanced Education) has offered externally a number of courses with the content and level of difficulty equal to courses followed by on-campus students, since the early 1970s.

How well it works is another question.

But one might ask the same sort of question about education where the teacher is "physically contiguous with his students so that the primary means of communication is his voice" (Keegan, 1990, p. 19).

Conventional university teaching has not solved, and it seems will not solve, the problems confronting education. Those problems are not new. Diamond et al (1975, p.14) summarised them this way:

(1) we have to teach more students an expanding body of knowledge,
(2) with relatively fewer teachers and less financial support per student, and
(3) while improving the quality and effectiveness of the educational program.

Education in countries such as the United States of America (Bork, 1984, p.178) is in trouble. If the problems confronting education are to be solved, changes will have to be made; they are probably unsolvable without the use of technology. Conventional teaching is not cost effective because it is highly labour intensive (Bork, 1987, p.4) and provides little economy of scale (Burnham, in Bernold, 1988, p. 255).

The educational program which currently seeks to address these problems is much as it was in 1975. This leads to the belief that we need a new kind of education as we approach the end of the twentieth century, with its accelerating pace of change.

Bork's (1987, p.3) prediction is that "computers are going to become the dominant delivery system for education" because they will become the "cheapest way to deliver education". The potential exists. Devices which the computer can control such as videos, could well be included as part of the solution. "Learning-at-a-distance possibilities deserve further study" (Bork, 1984, p. 180).

There are many problems to be overcome if Bork and Knowles' predictions are to become reality in the near future. But certainly the potential is there for the developments in information technology to revolutionise education in much the same way as writing and printing did.

This article focuses on the place of the computer in distance education. It asks "What is the role of the computer in education?" It provides a framework which can be used to classify the ways in which and purposes for which computers can be used in education. The framework can be used to facilitate discussion about the role of the computer, and to research the effectiveness and efficiency of computer applications.

A related task is to determine how the computer can be used to facilitate the accomplishment of educational aims and objectives.

If developments in information technology do provide answers to the problems confronting education, distance education will gain credibility and perhaps lose its Cinderella image.

Developments in Information Technology and Literacy

In the 1980s developments in information technology (IT) had a widespread impact on society, business and, more importantly for our purposes, education (Roblyer et al, 1988, p.11). There were calls for the integration of the computer into the curriculum. Students were to use the computer as part of their studies, and learn with the computer.

The integration of the computer into courses held out many promises.

> *The promises of computers are manifold. They can give each student a tireless electronic combination of secretary, mentor, and research assistant. Potentially they can allow students to work more indep dently and to do both more and better work.*
> (Heermann, 1988, p.3)

The extent to which that promise is realised remains to be seen; the extent to which it has been realised is not easy to determine. Even so one must be careful about dismissing the potential of the computer and related technology.

Socrates dismissed the introduction of writing into education, which up to that time had been primarily a matter of oral delivery and inquiry.

> *This invention [the written word] will produce forgetfulness in the souls of those who have learned it. They will not need to exercise their memories, being able to rely on what is written, calling things to mind no longer from within themselves...And as for wisdom, you're equipping your pupils with only a semblance of it, not with truth. Thanks to you and your invention, your pupils will be widely read without benefit of a teacher's instruction, in consequence, they'll entertain the delusion that they have wide knowledge while they are, in fact, for the most past incapable of real judgment*
> (Plato, Phaedrus, translated by Helmbold and Rabinowitz, 1956, pp.68,69).

Perhaps Socrates was right in some respects, but writing and the printed press revolutionised education. They also made distance education possible.

Developments in IT have contributed to a change in the definition of literacy in the information society (Hade, 1982) just as writing did in the days of its invention.

A few years ago the term literacy meant skills in reading and writing. The meaning of the term changes as means of communication change.

Exhibit 1 shows changes in communication, developments in which are cumulative, and do not replace the previous mean(s).

EXHIBIT 1

Medium of Communication	Required Literacy Skills
Verbal	Listening and speaking
Written & print	Reading and writing
Electronic	Information literate, requiring aural, visual, and computer literacy.

There is little doubt that for people to function effectively in an information society, there is a growing need to use computers and other IT. As Hade put it:

> *Because of the information explosion, the computer has become: (a) an amplifier of human thinking, (b) a respository for huge quantities of the world's data, information, and knowledge, and (c) a tool for complex problem solving... Because of the increasing quantity of information used in today's economy, computers must be mastered to make work productive.*
> (Hade 1982, p11)

Developments in IT have been and are viewed as being of such magnitude that they affect not only how graduates do what they have been doing, but give rise to questions about the fundamental nature of some subject matter itself.

These developments lead to the need to consider the part which computers could, should and will play in education. That part depends largely, but not exclusively, on educational aims and objectives.

Aims and Objectives

Problems have accompanied attempts to integrate the computer into the curriculum. Often attempts have taken a technological rather than a pedagogical approach. The aims and objectives of education have been given second place.

This is somewhat understandable. In the endeavour to come to grips with IT - hard disks, software, RAM, modems and other bits and pieces, the aims and objectives of the whole exercise have been overlooked.

> *The evidence of our neglect of philosophy as it applies to educational computing lies in the absence of a significant body of discourse on what computers ought to be used for in education...*
>
> *Until such issues are addressed, our progress will be limited, for we have failed to agree on the proper relationship between human and computer in educational settings* (Maddux, Preface to Roblyer et al, 1988, p6).

In addition to an educational computing philosophy, course developers need to determine educational aims and objectives.

To be consistent with the Dawkins White Paper on Higher Education (Commonwealth of Australia, 1988, pp.8,9), tertiary courses need to have a broad educational emphasis and a clear vocational orientation directed towards community needs and goals.

In general terms, what is/are the broad aim(s) of education? To Heermann (1988, p.46) it is to "help students to think critically - to evaluate and analyze the factual and conceptual material of a discipline". Computers can help students develop these higher-order intellectual skills. (Hade, 1982).

Barker and Yeates (1985, p.16,17) see the dissemination of knowledge as being of fundamental importance to education. With the information explosion evidenced by the growth in the number

of journals, the computer is seen as a vital tool to aid in the dissemination - by providing storage and data communication methods.

In addition to the dissemination of knowledge, Barker and Yeates (1985, p.21) list other functions that an educational system must support:

(2) foster the development of new knowledge,
(3) shape the minds of people,
(4) produce a workforce capable of handling the problems of society,
(5) encourage cooperation and collaboration where this is beneficial to society,
(6) provide guidelines for human existence.

There might be considerable debate about the aims of education (Barrett, 1987, pp. 248,249 lists ten teaching aims of post-school education) even though these are expressed in general terms (Romiszowski, 1981, p.43). Objectives are more specific and relate to a particular course. Comparison of different courses might show that objectives vary considerably.

The nature and purpose of a particular course needs to be settled as a first step in planning for the integration of the computer into the curriculum. One needs to know what it is that the students are to learn before deciding how and indeed whether to use computers in a course.

To the extent that courses have a vocational orientation educators should take steps to prepare students for the environment in which they will work on graduation. That environment is likely to include computers.

This being so, students should learn not only how to use a computer, e.g., as a tool to process data, but they need to be also brought face to face with the broader aspects of IT. One other point needs to be recognised. Computers need to reflect aims and objectives of education. However computers not only have the potential to change the way in which educators go about accomplishing those aims and objectives, but to also make changes to the educational aims and objectives and to the "very concept of education" (Heermann, 1988, p.187).

Just as the invention of the printing press reduced the emphasis of education on oral encounters, and resulted in an emphasis on reading and writing, so IT can bring about major changes, both in the way people live, and the delivery of education.

The computer and related technology have features which offer interesting possibilities as a teaching resource. Barker and Yeates (1985, p.25) list examples. They might well make major contributions to the accomplishment of educational aims and objectives.

But "how could the computer be used?"

How Computers Could be Used: a Framework

When considering the integration of the computer into the curriculum one of the first questions which arises is "How could the computer be used, and indeed, how should the computer be used?" The second question in particular is not easy to answer.

In 1980 Taylor wrote about the diversity of ways in which computers could be applied in education.

> *The application of computing to education encompasses a range of complex activity, formidable in its apparent diversity even for those who are simultaneously both computer specialists and educators* (p.2).

The range of ways in which the computer can be used increased in the last decade.
Taylor provided the tutor/tool/tutee framework as a "simple scheme for intellectually grasping a somewhat chaotic range of activities" (1980, p. 2) encompassed by the notion of using the computer in education.

Taylor's augmented framework (Anderson, 1984, pp.52,53), i.e.,

* Learning about computers or computer science
* The computer as tutor
* The computer as tool
* The computer as tutee

is useful when viewing the ways in which the computer has been or could be used in education. It could help arrive at conclusions about how the computer should be used in order to satisfy the aims and objectives of a particular course.

A second dimension can be added (Knezek, Rachlin and Scannell, 1988) to show the purpose for which the computer is used.

The computer can be used as a tutor, tool, tutee and/or as subject matter for the purposes of knowledge dissemination, knowledge generation and information management. Knowledge generation is often equated with research, but it embraces any use which uncovers new knowledge. Knowledge dissemination is what education is about. Information management includes the recording, analysis and publication (e.g., by electronic mail) of student marks and results.

The taxonomy has the potential to reduce much of the confusion about which Taylor wrote, and to provide direction into areas of research about the use of the computer in accounting education.

Hampton (1990) combined Taylor's framework with the Knezek et al dimension of purpose, to form a two dimensional matrix. The resulting taxonomy is shown in Table 1 (Opposite page).

The word instruction is often used instead of learning to give, for example, CAI and CMI.

The table indicates the wide range of potential uses for the computer, not just by the student, but by all of those who have an involvement in the educational process. An asterisk denotes a possible computer use for the purpose designated. The table is not meant to be exhaustive, merely illustrative.

But does research indicate that the use of the computer in a particular way for a particular purpose facilitates the accomplishment of educational aims and objectives, for example, better than conventional teaching does? Is it cost effective?

TABLE 1

A TAXONOMY FOR EDUCATIONAL COMPUTING

THE COMPUTER AS: (low level)	KNOWLEDGE DISSEMINATION	KNOWLEDGE GENERATION	INFORMATION MANAGEMENT (high level)
1. A TOPIC			
History	*		
Careers	*		
Technology	*		
System Operation	*		
Effects on Society	*		
2. A TOOL			
Word Processing	*	*	*
Statistical Calculations	*	*	*
Financial Records	*		*
Computer Games			
Simulations	*	*	*
Test Scoring & Analysis			*
Student Records			*
Electronic Mail	*		*
Expert System	*	*	
Databases, e.g.,			
Bibliographies	*		
Library Facilities	*	*	
Electronic Blackboard	*		
Hypertext/Hypermedia	*		
Desktop Publishing	*		
3. A TUTEE			
Programming	*	*	*
End-user programming	*	*	*
Flowcharting	*	*	
Authoring Systems:			
Computer-assisted Learning (CAL)	*		
Computer-assisted Management (CML)			*
ICAL (Intelligent CAL)	*	*	
Expert Systems	*	*	
4. TUTOR			
CAL	*		
Demonstration	*		
Drill & Practice	*		*
Games	*		
Simulations	*	*	
Problem solving	*	*	
Expert Systems	*		

Research

Extravagant claims have been made about the benefits of using computers, claims which often have not been supported by research findings.

The best way to settle disputes about the merits of computer applications in education is research. Unsystematic observations and anecdotal evidence are not sufficient. Some believe that the research which is needed must be experimental research (Roblyer et al, 1988, pp. 123, 124). The concept of cumulative progress is important. No single piece of research is likely to settle the dispute.

While the calls for research are appropriate, inquiry to date has, as is often the case, produced more questions than answers. The question of the effectiveness and efficiency of the computer in accomplishing educational aims and objectives and enhancing the quality of education and student achievement, is not an easy one to answer by research methods (Roblyer et al, 1988, p. 117).

One of the problems with the research which has been carrie it is the:

> *...wide variation in study focuses, procedures, materials and findings...[so that] the absence of commonality among them makes it difficult to generalize across findings* (Roblyer et al, 1988, p. 69).

If studies had a common purpose and produced replicable results, one would be better able to consider the implications of those studies for computer applications.

There is a need for a clear case to show that the use of the computer in particular ways for particular purposes in education, is effective and efficient. Roblyer et al have identified a number of specific areas of needed research (pp. 124, 125). If this research is not done, the computer and related technology may be largely discarded by many as another fad which did not live up to expectations.

Even though there is no "consensus on the effectiveness of computers as tools for teaching and learning in higher education" (Heermann, 1988, p.1[illegible]) and there are many unanswered questions, Roblyer et al (1988, pp. 69 - 114) make some tentative statements about results of their meta-analysis procedures used to examine research during the period 1980-1987.

The review by Roblyer et al (1988, p. 119) found almost no studies on computer applications as a total replacement for traditional methods. Earlier studies indicated CAL may be more effective as a supplement (Roblyer, 1988, pp.35,36).

Burnham claims that "Research on the effectiveness of computer based training is supportive and should give us confidence in what we can accomplish with it" (Bernold and Finkelstein, 1988, p. 254).

Research has not measured the benefits of a computer education for life in an IT society (Roblyer et al, 1988, p. 11). Rather it has focused on the effect of instructional computing on learners, and attitudes to computer use in instruction. CAL, the use of the computer as a tutor for the purpose of information dissemination, is thus an area for research.

Computer-Assisted Learning

Computer-assisted learning is not new. In the 1960s there were attempts to introduce the computer into the learning process. The attempts involved mainframe computers and the expenditure of large sums of money. One such experiment was PLATO at the University of Illinois.

Success from these endeavours was minimal. Scepticism developed when the topic of CAL arose. It still persists, but many detect that even "die-hard skeptics are beginning to acknowledge the fundamental usefulness of computer-assisted information and learning systems" (Knabe, in Bernold, 1988, p. 45).

The microcomputer explosion of the late 1970s and 1980s brought about renewed interest in CAL. Barker and Yeates (1985, p. 34) call it "an explosive revival of interest". There are a number of reasons which could be given to explain this renewal of interest, including the relatively low cost and high reliability of the microcomputer, and the availability of software which facilitates the development of CAL material and provides access for students.

Widespread access is important. Many regard the conquest of ignorance as no less important than the victory over hunger and disease.

> *It is implausible to imagine that the world's growing uneducated and under-educated population will be educated by means of traditional classroom instruction alone, where expenditures rise in proportion as additional students require additional classrooms and teachers. Traditional class-room instruction lacks economies of scale. Capital-intensive technology and scientific innovation should be given a trial .*
> (Melmed, in Bernold, 1988, p.79).

Although there is no clear and widely accepted definition of just what CAL is, it usually embraces a number of steps. Some material is presented on the screen, thus providing the student with information, principles and theory. Some examples might be given and then the student is tested for comprehension of the material presented. CAL methods include tutorial instruction, drills, simulation, instructional games and tests (Alessi and Tollip, 1985, p. 52, 53). The student receives immediate feedback on the results of the test, and if unsuccessful with a question, might be directed to additional material (Heermann, 1988, p. 4).

Devices can be interfaced with the computer to produce multimedia CAL, providing a much enriched learning environment. These devices include video tape and discs and speech synthesis unit (Barker and Yeates, 1985, chapter 4).

CAL may also provide indirect benefits.

> *... one of the great benefits of computer based training becomes apparent - it forces systematic design and development processes. We are required to think rationally and logically about our goals, objectives, concepts, structure, sequence, terminology, performance standards, and acceptable achievement levels.*
> (Burnham, in Bernold, 1988, p. 255)

Whether or not CAL should be used, depends on the particular situation. Barker and Yeates (1985,

p. 53) identified seventeen factors which might, individually or in combination, lead to a need for the application of CAL. Kearsely (1983, chapter 3) described four major types of feasibility which need to be examined - instructional, organisational, technical and economic.

There is evidence of strong interest in CAL in companies which are searching for cost-effective solutions to their training needs. Those needs are expanding, not contracting.

We expect to see the emergence of the PC as a key piece in the delivery systems jigsaw. The development of interactive PC/videodisc technology offers enormous potential to the whole industrial training marketplace. The limitation is no longer the delivery system but rather how skilled and innovative course designers and developers must be to take full advantage of the facilities available (Pritchard, quoted by Hawkridge, in Bernold, 1988, p. 32).

At the fifth world conference on computers in education, Kearsley spoke about new directions in computer based training. Training may well lead education in the implementation of CAL.

Not only is there a need in industry for such training, but with the introduction of the training levy (Velten, 1990, p. 26), funds will be available. Funds are an essential ingredient for success.

The development of CAL material can be very costly, and the learning situation needs to provide opportunity for those costs to be recouped.

There have been different estimates of the time which needs to be invested in the development of one hour of material for student use. Baker and Cook (1988, p. 22) say that one hour of CAL typically takes between 30-70 hours to produce. Well developed courseware has often taken closer to 200 hours of production time. This could be the major limiting factor on the extent to which CAL can be incorporated into tertiary education courses.

Teaching with computers is seen as a powerful addition to the means which the teacher has, and one which could prove invaluable. However it has "never taken on much importance in mainstream undergraduate education" (Heermann, 1988, p. 5). We really are still talking about potential despite the efforts of the last three decades.

The reward system of universities is another factor which limits the likely development of CAL material. Newman's (1988, p. 57) remarks about accounting have much wider application:

> *In recent years, it seems that the available resources in many schools and colleges have been directed into intellectual and statistical areas of research rather than research into better ways of teaching a basic competence in the discipline of accounting.*

With CAL the computer has a major involvement in the teaching or instructional process. This is not necessarily so when CML is used.

Computer Managed Learning

Baker (1978, pp. 7-11) attributes the development of CML to three themes - individualisation, behavioural objectives and educational technology.

The function of CML is in the control, administration and testing of the learning process (Pryor, 1988, p. 106; Stanford, 1988, p.116).

A CML system could employ written material and other conventional learning approaches in order to care for the instructional role. It is only when the work is thus completed, that CML begins. It is not necessary that this learning activity involve the computer at all.

> *For this reason, instructional design under CML is usually not as critical a factor as in the CAI philosophy - where learning takes place directly at terminals and where 'authoring' (i.e. instructional design) must be particularly sophisticated in order for CAI to be cost-effective.*
> (Pryor, 1988, p. 108).

The use of CML in education requires a number of steps (Stanford, 1988, p.116) to be taken if this type of application of the computer is to prove most effective. Modularisation is likely to be employed, whereby learning guides are developed for small manageable learning units. The type of questions which are sometimes used in CML include true/false; multiple choice; matching; completion and calculation. Some packages which are used allow randomly generated numbers or numbers within a specific range to be used in questions which involve the calculation of answers. Other packages will allow the random selection of questions, or mix the order in which answers appear, e.g., in multiple choice questions.

A CML system could provide the following test and management functions (Stanford, 1988, p.117)

* generating unique tests for each student
* marking tests immediately on demand
* providing an electronic mail facility
* allowing the lecturer to monitor individual student progress through the course
* recording student marks and other data
* providing various reports on demands to the lecturer
* providing detailed statistical analysis of student performance
* generating detailed statistical analysis of the answers
  to the testbank so that testing procedures can be modified in the light of experience.

Pryor (1988, p. 109) lists some thirty benefits which he claims have been identified under a CML system.

With this use of the computer the teacher/academic is relieved of the tasks of administration of tests, recording and analysing marks and associated tasks that take time away from the actual teacher-student interaction.

CML could have an important part to play in eliminating the procrastination factor for external students - "distance education appears to provide a fertile ground for putting off responsibilities" (Wilkinson and Sherman, 1989, p.24).

Conclusion

The demands made of those responsible for the dissemination of knowledge, are increasing.

> *For the forseeable future, education will find itself under external pressure to reduce costs and to become increasingly responsive to both national and international requirements.*
> (Carrs, 1988, p. 56).

The environment in which graduates work is becoming more complex. It is questionable whether the unaided human brain can continue to cope with the "increasingly complex demands that are placed upon it" (Barker and Yeates, 1985, p. 38). That environment is subject to an "accelerating pace of change" (Knowles, Foreword to Hodgson, 1987, p. vii) leading to a need for a concept of lifelong learning and a demand for continuing education.

Based on what has happened in the past, the problems confronting education will not be solved solely by the traditional approach to teaching.

Developments in information technology appear to provide, at least in part, a solution.

For better or for worse computers have already had an "irrevocable impact on our educational system" (Roblyer et al, 1988, p. 11). Some students will never know education without them. Developments in technology have progressed to the stage where it is possible to deliver an entire college course by microcomputer to students at a site from campus (Detzner and Brothen, 1988, p. 213).

If IT is to be used to solve problems, let us not imagine that the solution is going to be cheap. The development of courseware is a time-consuming, costly exercise. Benefits will not accrue unless costs are incurred; even then, care must be taken to ensure that computer applications are appropriate and provide the opportunity for costs to be recouped.

But technology will not replace people. The prospect of being replaced by a machine has limited appeal to those involved in the educational process. Their cooperation, which is "vital if delivery systems or learning networks relying on new technology are to get off the ground, will not occur so long as assent implies redundancy" (Hodgson et al, 1987, p. 75).

IT supplements, not replaces, the traditional means of communication. Print will not disappear simply because of computers. Nor should it, because in many instances "print is decidely superior to screen presentation: it is easier to read, it facilitates leafing and browsing" (Holmberg, 1989, p. 72).

Just as the invention of written word and print did not do away with oral delivery and inquiry, nor will IT do away with teachers. The medium of communications mix will change, as will the role of the players. But the quality of players will be even more important if education, and continuing education, is to be more widely available and provide solutions to its problems. The better features of each means of communication need to be used.

Educators must ensure that they are not driven by technology. The pace of change makes it difficult not to be. Developments in IT should be used - when they contribute to educational aims and

objectives This article has provided a framework which is designed to facilitate discussion about the role of the computer in education, and provide direction for the much needed research.

At this stage one might well ask, "What about Cinderella becoming a princess and distance education, how does this article relate to them?"

It is the task of education to make educational opportunities available, not only to those who study on campus, but also to "people at their convenience in terms of time, place and pace through their life span" (Knowles, foreward to Hodgson et al, p. vii).

If external students are to be provided with the same educational program, in qualitative terms, as students who attend face-to-face classes, they must have the same access to and continuing experience with the use of computers and other related devices, as those internal students. Residential schools can and should provide part of the solution to this requirement.

Once steps have been taken to address this continuing access problem for external students, all sorts of opportunities present themselves to effectively and efficiently use the computer in distance education.

The development of new communications technology is one of the reasons Keegan (1990, p. 4) gave to account for the improvement in distance education in the 1970s. Developments in IT have the potential to contribute to greater improvements, to change the image of distance education and at the same time provide a solution to the problems confronting education.

Computer assisted learning can have a part. So can CML. Both can have a much greater impact at the tertiary level.

IT can be used much more widely in the educational process to present information, guide the student, provide practice opportunities for the student and assess learning (Allessi and Trollip, 1985, Chapter 6). This is what effective education and instruction is all about. It can happen with external students and internal students.

But Cinderella will not become a princess:

* if students do not have continuing access to computers;
* unless and until funds are invested on a scale appropriate for the task;
* if educational aims and objectives are neglected;
* should research findings be ignored;
* without a computing philosophy; and
* under a reward system which does not recognise efforts to improve teaching.

Oh dear, I do wish there was a fairy godmother with a magic wand.

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COLLABORATION TO IMPROVE ACCESS
A Case Study in the Provision of Continuing Education at a Distance

Gail Hart and Dr Lynette Russell

Introduction

Continuing Professional Development programs offer an opportunity for Universities to make an important and immediate contribution to the health sector. Tertiary institutions have been dependent upon health care facilities to provide access for students undertaking clinical experience; they have also required teaching space and residential accommodation; and they have sometimes requested experienced staff to be seconded to assist with clinical supervision. The benefits are not all one way - students bring stimulation and enthusiasm to the workplace and university lecturers themselves sometimes contribute to in-service programs. There is scope however, for a far more equitable relationship between the health sector and tertiary institutions in the development of an integrated continuing education program.

Continuing education consists of systematic learning experiences designed to expand the knowledge and skills of postgraduate award programs which are designed to prepare an individual to enter the profession or extend professional expertise in an area of specialization.

> *Continuing education courses usually respond to a particular goal of the practitioner, are more specific in content and shorter in duration than courses leading to an academic degree.*
> (Chalmers and Kristjanson, 1987, p.129)

This definition highlights an important feature of continuing education: it targets practitioners who have the opportunity to implement learning in the workplace almost immediately. Even educational programs with carefully integrated clinical experience can rarely match the immediacy which characterizes continuing education. This, coupled with the wealth of experience which practitioners contribute has the potential to create a dynamic and exciting teaching/learning experience. For the practitioner it offers the time and space to reflect on practice and share clinical expertise. Learning does occur in the workplace. Yet without the time and encouragement to reflect and then translate that reflection into action it may be difficult to generate new knowledge from clinical experience. (Jarvis, 1987, p.50) In this way, continuing education offers important benefits to the health care facility. Although few studies have demonstrated a direct relationship between continuing education and health care practice, numerous surveys have validated that practitioners believe that continuing education is important to the delivery of quality patient care. (Hopkin and Perlich, 1985, p.33) It is this important aspect of continuing education that makes it a relevant undertaking and financial commitment for Professional Associations and Employer Groups.

The Potential for Collaboration

Traditionally continuing education or in-service education was offered within the health care facility by educators employed for that purpose. This has become a less viable option as the roles of health care professionals have expanded, technology has increased, and health care budgets have tightened.

(Boston, 1986) One or two educators working with limited educational resources, can not be expected to meet the needs of a diverse and ever changing workforce. Universities, on the other hand, have very good educational resources (libraries, audio visual equipment, classrooms, support services (graphic artists, instructional designers, printery), and an establishment of educators with a wide breadth of teaching experience and clinical expertise. Recently universities have been challenged to become more entrepreneurial by marketing their educational and research expertise to attract funding from less traditional sources. An obvious resolution to the problems of health care agencies and tertiary institutions is co-sponsorship of continuing education programs.

Co-sponsorship is not a radical or untried concept. Meyers (1984) defines co-sponsorships as:

> *a means whereby another agency, either service or educational, joins the School of Nursing in the provision of a planned learning experience for professional nurses. (The co-sponsorship agency is listed in the promotional literature as such.) The responsibilities and involvement of each co-sponsorship agency will be determined by mutual agreement between the parties involved.*
> (p51)

Freeman, del Bueno and Wake (1984) indicate that many tertiary institutions have contracted with groups and organizations as a means to diversify and expand their markets. Meade, Burger and Nicksic (1985) describe a contract between the Continuing Nursing Education Program (CNEP) at Indiana University and four nearby hospitals to provide continuing nursing education activities.

> *The results of three years of contractual agreements between the university-based CNEP and area hospitals seem to indicate that it is both cost-effective and needs-effective for both groups.*
> (Meade, Burger and Nicksic, 1985, p126)

The University of Louisville School of Nursing Continuing Education Program also developed a plan to meet the continuing education needs of a metropolitan nurse population without placing additional strain on diminishing educational budgets or on the faculty. (Freeman and Adams, 1984) The contract between the School of Nursing and the health care agencies provided for the faculty to be reimbursed beyond their base pay for teaching in any continuing education activities. Payment to lecturers who were not employed within the School was negotiated on an individual basis. The arrangement proved to be beneficial to both the University and the agency involved. Benefits to the agency included lower costs, accessibility and exposure to a faculty skilled in adult learning. Benefits to the University included the opportunity for faculty to share research results and demonstrate expertise and guaranteed income to the school for offerings presented. (Freeman and Adams, 1984, p.36)

The Professional Association also has an important role in providing continuing education for practitioners. The education of its members is often indicated as one of the major responsibilities of the professional association and can be extended to potential members as a strategy for building membership. The NSW College of Nursing has been less active because of the problems associated with organizing teaching space, identifying appropriate community based personnel to teach the programs and ensuring access to local libraries, educational resource material and audio visual equipment. With greater co-ordination between health care organizations it would be feasible to provide a planned continuing education program that was accessible to practitioners throughout the state.

> *Some state nurses' associations have been involved in the design of a curriculum framework for all of continuing education in the state...A continuing education workshop planned at the local or state level of a professional association can be shared with other local or state units. In this way, planning becomes more cost-effective and less duplicative and fragmented.*
> (Puetz, 1985, p.92)

Too often continuing education offerings are planned and scheduled without a thorough survey of need, a well planned marketing strategy, and careful evaluation of effectiveness. Limited resources, tight development schedules, and the expectation upon continuing education departments to be self funding if not profit making have contributed to this problem.

The Proposal

In 1988 following an approach to the NSW Department of Health and advice from the then Manager of the Division of Nursing, the School of Nursing and Health Administration contacted the NSW Nurses Association and the NSW College of Nursing. The university would provide expertise in distance education to develop continuing education courses in the distance mode. The NSW Nurses Association would provide funding to improve access to professional development opportunities for its members and the NSW College of Nursing would enhance and extend its offerings to meet the educational needs of nurses outside the Sydney metropolitan area. In addition the proposal recommended a comprehensive survey of the continuing education needs of registered and enrolled nurses living and working within NSW.

The Project

The NSW Nurses Association was successful in lobbying the NSW Minister for Health to contribute half the cost of the project and the proposal was accepted. It was decided to begin developing courses at the same time that the survey of educational need was being designed. There was concern that many nurses had in the past completed questionnaires without realizing the benefits in terms of improved access to education. There was also some degree of confidence about educational priorities. For example courses appropriate for nurses working from palliative care and gerontology were in high demand at the NSW College of Nursing and generated numerous enquiries at CSU-Mitchell.

Initially three new courses were developed at CSU-Mitchell in the distance mode: *Gerontology for Enrolled Nurses*, *Palliative Care* and *Strategies for Professional Development*. University lecturers were paid a fee above their salary for writing course material and outside lecturers were offered a standard fee equivalent to that paid for the preparation of units within an award course. The course material included a printed study guide and book of resource readings; *Strategies for Professional Development* also included an audiocassette to complement the study guide and the option to include tele conferencing and interactive radio to reinforce course content. Both Palliative Care and Strategies for Professional Development were designed for registered nurses and the content and rigor of assessment was planned as the equivalent of a unit within the Bachelor of Health Science (Nursing) program at CSU-Mitchell. This equivalence ensured that if a nurse successfully completed the course and then applied to undertake the degree program they would be eligible for credit. This credit transfer and potential articulation into an award program was applicable also to the

courses developed by the NSW College of Nursing. In consultation with instructional designers at the Distance Education Resource centre (DERC) at CSU-Mitchell, and academic staff from the School of Nursing and Health Administration nurse educators employed at the NSW College of Nursing developed the course *Advanced Nursing Studies (Womens Health, Infertility and Midwifery)* in the distance mode.

The courses were made available through the NSW College of Nursing in 1989/90. They were advertised as an insert in *The LAMP*, the official journal of the NSW Nurses Association and in the information circulated about course offerings at the NSW College of Nursing. The courses were available at a modest cost which covered the distribution of resource material and tutorial support. All the courses were fully booked and several were over subscribed indicating that they were meeting a real need. Each of the courses will be evaluated by the NSW College of Nursing using the same format applied to all course offerings.

A questionnaire to survey the continuing education needs of registered and enrolled nurses living and working in NSW was designed by a team at CSU-M. (Hines, 1990) The questionnaire was included as a four page centrefold in the March 1989 issue of The LAMP. The findings supported the assumption that rural nurses were particularly disadvantaged in terms of access to continuing education. Seven hundred and ninety four (794) nurses responded to the questionnaire representing both registered and enrolled nurses. Over 70% of all respondents expressed dissatisfaction with their current access to continuing education. This percentage increased to 83% when nurses outside the Sydney metropolitan area were considered as a separate group. The report also demonstrates the interest in distance education and the personal commitment that nurses are prepared to make in order to upgrade their qualifications. The preferred mode of study for continuing education courses by distance were written study packages with readings and 1 to 2 day workshops. Ninety three per cent (93%) of the respondents were prepared to spend at least 3 hours per week of their own time studying and over 16% indicated a willingness to devote more than 10 hours per week to study. Ninety six per cent (96%) indicated that they were prepared to submit assignments in order to gain feedback on their progress. The most frequent reason given for undertaking continuing education was to improve nursing skills

The project also included the development of two publications. *Teleconferencing for Nurses* (Geddes, 1990) and *Teaching at a Distance: a workbook for nurses* (Wilkie, 1990) is a simple and concise guide for nurses who wish to participate in or initiate a teleconference. *Teaching at a Distance: a workbook for nurses* offers a step by step guide for the development of course material in the distance mode. Both publications make an important contribution to the literature related to distance education and nursing education.

The Benefits

The most important benefits of the collaborative project have been realized by the consumer. Nurses living and working outside the Sydney Metropolitan area have enjoyed improved access to high quality courses at reasonable cost. By undertaking a course nurses can gain confidence in the distance mode, demonstrate success at tertiary studies and improve their chances of acceptance in the highly competitive degree conversion programmes for registered nurses. In this way the courses offer the immediate benefits of a continuing education program and the longer term benefits associated with career planning and progression.

Each of the partners in the collaborative venture gained. The NSW Nurses Association is extending its service to members in the area of professional development and is addressing the educational disadvantage experienced by rural members. The NSW Department of Health is ensuring a better educated and more career minded nursing workforce. The NSW College of Nursing has developed skills in distance education which are rapidly being applied to a range of continuing education programs in order to better meet the educational needs of rural nurses. The School of Nursing and Health Administration undertook an ambitious project without financial risk. Staff of the school were able to share knowledge and demonstrate expertise in research, distance education and specific areas of nursing practice.

By using the resources of four different organizations many of the pitfalls experienced in the development of continuing education programs were avoided. The course offerings were thoughtfully prepared, a thorough survey of need was conducted, an effective marketing strategy was implemented and a careful evaluation of effectiveness was planned. There are plans to continue the collaboration and extend the course offerings. The future challenges include applying distance education strategies to more clinical areas of study and exploring the use of audio visual resources, teleconferences and interactive radio to enhance printed course materials.

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OPENING POSSIBILITIES.
How Distance Education can serve small organisations

Stephen Relf

The NSW Police Service has initiated a DE course to train its senior staff in financial management to help them cope with the Government's reorganization of its budgetary processes. In order to assist in organizing and running the course by distance education Charles Sturt University was contracted and the Distance Education Resource Centre at Mitchell was asked to assist. The contract specified required assistance in the layout of the printed notes and design of the cover as well as printing and despatch of the notes. This contract was made to complement the structure of the small educational body called the Financial Management Development Branch (FMDB) within the Police Service. It sets an example of how small organizations can use the University to assist in offering distance education courses.

The objective of the contract was to provide consultancy to the FMDB in the areas of layout of their study notes and provide a graphic design for the covers of their study notes. As well the printing and despatch services would be utilised.

The principles of layout for instructional material are summarised in the **Style Manual** prepared for the production of the study notes at CSU-Mitchell (Relf, 1988). This style combines the use of variations of type style and size and the use of white space to visually indicate the structure of the content and to assist students study efficiently. Type size varies in descending order down a hierarchy of four or five heading levels and type style varies on a similar hierarchical order to visually reflect the descending importance of the headings. For example the size and style of the headings adopted for the CSU-Mitchell study notes is:

Level one headings or Topic title	16 pt Helvetica Bold Upper case
Level two headings or Section heading	14 pt Helvetica Bold Upper/lower case
Level three heading or Sub-section heading	12 pt Helvetica Bold Upper/lower case
Level four heading or Sub-sub-section Heading	12 pt Times Italics Upper/lower case

This typeface variation is set against the text type size of 12 pt Times Roman upper/lower case. It has been found that this simple variation is sufficient to indicate the difference in level heading and enhance understanding of the structure of the notes while not distracting from the content of the text.

Type style and size is combined with white space to reinforce the visual effect of the structure of the notes. Spacing above and below the headings are designed to indicate which part of the text a heading belongs to, and to indicate where the heading fits into the structure of the notes. Thus the spacing recommended by the *Style Manual*, on a measure of a line spacing is:

Heading Level	Space above	Space below
1	Top of page	4
2	4	3
3	3	2
4	2	1

Figure 1 below provides an example of the result of this style. Note that for the purpose of illustration the page has been reduced thus the type sizes are not the real size but they provide an example of the overall effect of the style. Note also that the lines are not justified on the right. This is because in justifying on the right the space between words is uneven making the text difficult to read.

There is another feature of white space which relates to the space around the text. Following the advice recommended by the Open University, the style allows large margins around the text in order to provide relief for the reader (Rowntree, 1986, p281). The principle is that the study notes

FIGURE 1

Notes on the Reading

Science is supposedly an objective examination of the world without the intrusion of bias or value judgements. In recent years it has been increasingly recognised that the very questions, or hypotheses, that scientists begin with come from specific social conditions. The kind of evidence that is recognised is also culturally specific. That is, science itself does not exist outside a historical and cultural framework which determines not only the questions that are asked but also the answers that are accepted.

Some fairly compelling evidence of the limits of scientific objectivity comes from feminist historians looking at the history of science.

Read

Jacoby, R. 1977, 'Science and sex roles in the Victorian era', *Biology as a social weapon*, Burgess Publishing Co., Minneapolis, pp.58-68.

Notes on the Reading

The scientists Jacoby writes about were respected men, not indulging in some dishonest or fraudulent practice, but pursuing proper scientific knowledge. Note specifically what Jacoby's evidence implies about the influence of ideology on both the questions asked and the evidence compiled.

Questions

(1) How did it come about that scientists accepted as proven facts, things that seem so obviously erroneous today?

(2) Can science be 'objective'?

(3) Is Jacoby trying to change history to her story?

needs to use more white space in the margins than a novel because study reading is more difficult and is more tiring than recreational reading. As well it has been found that if the line is too long or the column of the text too wide, reading is too difficult because the reader's eyes become delayed in locating the next line (Rowntree, 1986, p284).

These principles were applied to the study notes for the FMDB, though the actual specifications were different from those described above. The alterations were necessary in order to accommodate the differences between the word processing package used at the FMDB and the one used at CSU-Mitchell. As will be explained later, this added another dimension to problems of designing layout.

By the use of other type sizes and styles, economies were able to be achieved for the job overall. This means that the use of the University is a viable option for smaller organizations. So in overcoming these difficulties of designing layout, the way for small organizations such as the FMDB to use the publishing expertise of the University to economically offer their own distance education courses has been opened.

Contextual Framework

The organization within the Police Service responsible for courses is the Financial Management Development Branch. It is a small section with a staff of three educators and one secretary/word processor operator. The team are experienced at running in-service education programs though distance education is a new teaching mode for all educators. In preparing the course the team proceeded through a series of drafts, consultations, reviews and finalised with content specialists at all levels of their course development — from the course outline through to the final drafting of the study notes. In preparing all the material for all stages of development the word processing facilities of the Branch were used.

The service they required from the University did not include word processing. Text input was prior to requesting assistance from the University. Their assistance however included the production of publication quality notes that was beyond their resources. Continuing their professional approach to producing this course, the branch consulted the University to provide this service. This procedure indicates a recognition that the production of distance education study notes provides a public and permanent record of some or all of the instructional package they had created. It is a recognised aspect of distance education in academic writings, Shaw & Taylor (1984) and Kelly (1988), and is also an indication of how the facilities of a large publishing house like CSU-Mitchell can be valuable to small organizations.

While the contract specified a one-day consultation in relation to the physical layout of the study notes it developed into instructional layout of the notes as well. The consultation for assistance with layout was understood as working briefly with the writers to describe the principles of using type size, type style and white space discussed above. Then it was expected that most of the time would be spent with the word processor operator designing the actual type sizes and styles and white space to use. However once I arrived at the FMDB their agenda quickly became clear. Most of the time was spent with the writers discussing design considerations of the instruction. Only a small amount of time was spent on discussing the design considerations of layout.

Project

Overall the FMDB undertook the development of this course very thoroughly. They had consulted a number of content experts to give them guidance and feedback about their course. They also received consultation about the instructional design of the distance education mode of teaching. And finally they received consultation about the layout of their study notes.

There were two significant factors in the final consultation that constrained a simple application of the principles of layout for this course. First, the study notes were to be processed at the FMDB and printed on their printer for their consultants to review. Therefore the layout needed to be compatible to the specifications of their word processing package and their printer. Second, as the study notes were to be sent to the University in a hard and soft copy form to be transferred to Microsoft Word for Windows to be printed on the laser printer, the layout had to be able to survive the transfer.

If the layout was to be successful, then transferring and printing the study guide at DERC should require a minimum input for the DERC word processor operator and still be consistent with the principles of layout whether printed at DERC or the FMDB.

Type size variations from the text size 12 pt Times Roman were lost in transferring so this feature was not able to be used to indicate the hierarchy of headings. Instead of using type size to indicate the hierarchy, type styles were used. Heading levels 2, 3 and 4 were all 12pt Times Roman but were varied by upper case bold, upper/lower case bold and italics respectively. The type size for level 1 headings was changed by the operator at DERC without too much difficulty as these headings were easily located.

White space above and below the headings were the same as the Style Manual described above, and the column width was adjusted to sixty characters wide which provided good white margins around the text. (See Figure 2, next page)

As expected there were problems in losing format in the transfer to Word for Windows, particularly with tables. There were some other losses of format when for example space-bar was used to indent some text instead of tabs or hanging indent commands. These losses, and the problems of using the new Word for Windows package were overcome and plans to streamline the translation process have been established. The printing and despatch parts of the contract went ahead without any trouble and were reasonably costed.

Conclusion

This contract shows that the University is able to cater for small organizations wishing to offer training by distance education at a reasonable price. While the Police Service is not a small organization the FMDB is, and the assistance that has been provided has complemented its structure very effectively. Small businesses, industrial or professional organizations, community and non profit organizations would be potential clients that could avail themselves of the production facilities of the University.

The lessons to be learnt are that such organizations would be likely to require instructional

FIGURE 2
Extract from "Financial Management"

adjust the level of expenditure to take into account factors which you are aware of that would cause the expenditure for the ensuing year to be different from the previous year. These factors could be increased charges, or for example, the leasing of an additional building.

Determining a Basis for Discretionary Costs

Once the funding requirements for non-discretionary costs have been determined the next and more difficult task is to determine a basis for allocating funds for the remaining costs.

As we mentioned earlier the level of discretionary costs is affected by management decisions. Decisions which require staff to travel for example can result in changes of costs from overtime, travelling allowance to fuel.

A popular and standard way of allocating for discretionary costs is to analyse each cost and see if there is a factor that has a strong correlation to the particular cost under scrutiny. To correlate means "to place in or bring into mutual or reciprocal relation; establish in orderly connection".

In simple terms this means that the cost in question changes whenever the correlated factor moves. A simple example is that there is a strong correlation between expenditure on motor vehicle fuel and the number of motor vehicles allocated to a particular area of operation. The motor vehicle therefore becomes a "cost driver" for the expenditure of fuel, servicing, tyres etc.

We will now examine some of the obvious "cost drivers".

People Costs

One common argument put forward is that all discretionary costs are people related and therefore the allocation process can be simplified if funding is allocated on a per- capita basis. There is no doubt that this simplifies the process but not all costs are people related and if they were, the per-capita requirements across a decentralised organisation such as the Police Service, are not the same.

To examine this last proposition further it should be obvious that the people costs of field staff are greater than office staff. This distinction in staffing classification is a subjective one and cannot be related to the old classifications of sworn police and civilian staff.

It should also be recognised that the costs associated with field staff will also vary across the organisation with those costs for country staff being higher than their city counterparts.

assistance in distance education as well as assistance with layout, graphic art, printing and despatch. Instructional design would be an inexpensive component because the design of instruction could easily and quickly be determined in consultation between the writers and the instructional designer from the University. There would also need to be careful analysis of the compatibility of the word processing packages and trials consisting of large amounts of text to iron out the problems of incompatibility. The other major area that would require detailed preplanning is the specifications for the word processor operator to follow to ensure that there is minimal duplication in word processor time in the production of the material.

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