

## **The impact of new communication technologies on role and function in traditional education support services**

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Focusing on the function and role of educational support services in the light of continuing technological development, this paper discusses the changing relationships between managerial and task performance levels in tertiary educational organisations. Specific reference is made to the impact of computer technologies and the demands of the user.

Twenty years ago when we began to introduce computer technology to perform the task level work required to manage access, storage and delivery of information in tertiary institutions, the administrative grouping of educational support services was clearly defined by function (ref. note 1). Each support unit, (the library, print shop, media production and delivery, educational development) recruited staff to operate machines and perform tasks unique to the form of each function. Managers of each unit were recruited from a background of experience and knowledge and demonstrated expertise in both the task and management levels of these functions.

The introduction of mainframe computer services did not radically upset the status quo. A suitably qualified person to head the computer centre was recruited from a background in programming (task level), systems analysis and engineering. In most cases the unit reported to the director or registrar. Certainly, computers had little to do with the books located in the library and nothing to do with the processing of information relevant to the management of, and access to the information the library held. Cataloguing tasks were defined by a scholarly approach to indexing and access to globally held bibliographic information was achieved via published reference works and specific purpose bibliographies. Text delivery was print dependent.

Now, computer based information and communication technologies perform most task level work in libraries. Circulation, bibliographic and document delivery functions involve microprocessor technology at all stages. Access to information about local, state, national and international information works may be had online.

The traditional functions become unsettled when the print shop acquires a mainframe with word processing and graphics generating capacity, begins to store information and allows access to it online beyond its geographic boundaries. Certain traditional roles blur, and form, as a means of defining function, role and territory, becomes unclear when the former typesetting/lithographic works utilise digitally supported technology to perform the tasks of storage, retrieval, typesetting, and layout functions. Furthermore, there is some considerable impact on the traditional role of both the library and the computer centre when the print shop applies for capital funds to dump mega megabytes of information onto high density write once read many (WORM) optical disks and proposes that a local area network (LAN) be utilised to retrieve and deliver information at terminals and printers remote from the print shop site.

As an evolutionary progression of its management function the computer centre takes up the issue that a LAN is sensibly required to link the many mini and mainframe stand-alone computers on campus. These machines were originally acquired for, and dedicated to, the functions of teaching, number crunching, resource management, accounting and ancillary data base management, resource administration, and library processes. To add further to the blurring of form and function multiple personal computers are utilised by individual students and staff whose on-board, individually owned, software allows them access to computing power which ten years ago could only be accessed on a time share basis via the one mainframe on campus.

The new role of reference librarians providing operating access to online searching of national and international bibliographic data bases is challenged by PC and communications software allowing individuals direct online access to, and retrieval of, commercial data base products. The library's acquisition of its own mini computer to administer its circulation of materials and online public access catalogue (OPAC) also challenges the traditional role of the reference librarian. Sophisticated graduate students already familiar with access to such data bases utilise workstation and communications software while the institution's accounting system falls short of being able to automatically handle individual telecom costs and data base search charges.

Meanwhile small departmentally developed computer networks linking personal computers spring up in Mathematics, Business and Architecture departments as graphic plotters and number crunching capacity are used for training professionals. The computer centre manager is then motivated to stress that senior management should pursue benefits from coordinated planning so that incompatible technologies do not isolate and diminish access to computer power and the potential communications power inherent in bulletin boards, downline loading of data, mainframe and supercomputer time sharing.

### **Function and role issues**

Issues are raised by the separate development of video production and video collection development. The on-campus distribution of video by the

development of video networking shows cost benefits, but the expense of separate ducting is promoted by the suspicion of telecommunications and the computer centre personnel, who maintain that video signals in coaxial cable laying next to their own services may interfere with their own star network. Sooner or later the question is raised - cannot a Local Area Network carry both digital and video traffic and in so doing resolve the ducting issue and further meet user requirements? In place of the ducting controversy the issue of who manages what is raised. Management itself is challenged since LANs by their very nature manage network traffic and the manager's role becomes more so that of a manager planner.

As the move from function defined management is accelerated by these technologically driven trends, human ambition naturally takes on a negative face and empire defence and expansion pull and stretch old functional boundaries. Tension and paranoia, fairly easily managed under the perceived stability of pre-digital regimes now seem far less easily managed. Managers recruited from the pre-digital form and competent in the management of the task level there, find or deny that systems analysis skills are as crucial to the managerial role as person management skills.

Functionally defined roles tend in my view to distort and potentially lead to a diminished capacity of the educational administration to meet the requirements of individuals who teach, of individuals who create learning environments, and of individuals who enter the organisation to learn.

For example, if the manager of the print shop moves his definition of the function of the unit from that of publishing locally required quality print and graphic products to that of the production of other media, the role of the unit becomes one of media production. The strong linking factor is, it is argued, that of the generation of graphics by digital as well as photographic means, tasks common to both functions. The old audiovisual production unit is merged with the print shop in order to avoid duplication of both systems and human effort. The next step in the function/role issue is to argue that if the new unit's role is to have credibility and its products be educationally sound, the educational development unit should merge with the media production unit. Thus, in using the function/role paradigm the production-oriented manager fails to associate the primary function of educational development with its role of supporting the curriculum development and interpersonal communication skills of the people involved in teaching.

Meanwhile the Library has in print form the interpreted set of Bureau of Census and Statistics data. The Computer centre has the raw data in digital form. CD-ROM is introduced by the library and added to its already sizeable collection of software, including some programs hitherto only executable using mainframe power (such as the SPSS program). It also has a sizeable collection of information in audio and audiovisual formats with the associated technology for individuals and groups to use it.

Those tertiary institutions which came to terms with the concept of the learning resource centre (LRC) in the early to mid 1970s are probably in a

better position today to see production and distribution of information as a coordinated set of functions rather than the process/function/role being the prime delineator of management territory. Such a concept (ie. LRC) saw the learner as a user of learning resources. With educational support services housed in the same building and managed as the one functional unit, a systematic model of information provision was subordinate to; curriculum development, the production of material in house or acquired through purchase, and the provision of information packages to support teaching strategies related to learning objectives. Organisational issues were raised and solved in accord with stated educational objectives and the broad mission of the organisation.

### **Interrelationships of educational support/service units**

It seems to me that, even in the pre LRC and digital days, the print and media production area was involved in information production, storage, retrieval and distribution. Similarly the library acquires, stores, organises, retrieves and distributes information regardless of form, and provides access to bibliographic sources at the state, national and international level online. The computer centre stores, provides the power to manipulate, and also to distribute information. These units have always functioned in support of the information business. Now, at the task level, similar technical skills and technology are utilised to meet perceived user requirements.

What are the current relationships between the computer centre, library, media production and educational development groups? How might a new organisational structure incorporate the effects of the new machine technologies so that the broad mission of our business may be better achieved? The old method of defining relationships and organisational units by technical function appears to give rise to conflict, which is no longer a positive motivator for the manager and staff of each unit, as the boundaries become blurred by the ill-planned adoption of new information and communication technologies. The begged question here is that we currently do not meet our broad mission efficiently and effectively, given our current organisational structure.

Let us define the requirements of our users and see if our present provision of educational support services is meeting those requirements. There are two broad users of our services - the academic who is involved in research, teaching and learning, and the undergraduate and graduate student who is involved in the same activity with perhaps a greater emphasis on learning how to learn than on research. Both users seek relevant information, retrieve it and store it, manipulate it, organise it, and disseminate it by interpersonal, print, audio and audiovisual means. This process is an information management process. Whether we have our sights on the 1960s or 1980s we are providing services which facilitate this process.

### **Information searching**

Seeking information in order to manage it in today's tertiary institution is, in

my experience, a time consuming and inefficient journey through a hybrid of information processing formats. The stages of this process as I view them are:

- find relevant information
- retrieve and store relevant information
- manipulate relevant information
- organise relevant information
- disseminate relevant information.

Now, if I were required to submit a major work my first port of call in finding relevant information is to approach colleagues working in my field. I broaden this checking process by contacting my peer group just to make sure I am on the right track and make mental notes on the way ... no hard technology involved so far. Depending on my personal learning style, I then go to the library and, armed with a pencil and 3 by 5 cards, search the card catalogue for all those works acquired by the library which have not been retrospectively loaded onto its automated data base. I transfer the information onto my cards.

Still armed with my cards I go to the OPAC terminal and, because it is thoughtlessly not provided with a screen dump printer (let alone an intelligent capacity which will allow me to store the results of my searches and print them out in alphabetical order) I transfer my results by hand from the screen to my, by now, lovingly sorted cards. My search widens. I check major bibliographies to confirm my search strategy is correct and have the results of that transferred onto photocopy. Now, because my work must be submitted with a bibliography and because I know from my previous B grades that this component of my work is viewed seriously by my mentor as evidence of thorough information seeking strategies, I decide that a wider literature search is required and consult my reference librarian. The output of several visits is an online print out of searches of national and international data bases.

At this point I decide that I have located sufficient information and know from experience that more citations will be added after I have full text retrieval of monographic and serial publications. My card index is becoming quite cumbersome so I book a stand-alone PC at the library, select a data base software package and begin to key in by hand information which was largely retrieved from digitally stored sources anyway.

My next step is to retrieve and store relevant text, visual, audio and audiovisual information. Copyright regulations and technical problems do not allow copying of information from latter sources in their original form, so I transcribe utilising freeze, view and visual search facilities. The products of this step will be, I expect, familiar to you - bits of text photocopied with relevant text highlighted, major texts borrowed or purchased. Those not located in local libraries are borrowed on inter library loan (ILL) - a long wait for those which may be key works hold me up and stretch my motivation. I also find I cannot follow a time management strategy since the library does not offer a booking service which would ensure that the texts I require are available for my planned visits to the campus.

My next step is to manipulate the relevant information, organise it so that it makes sense. I cut and paste, write and rub out, process my original data using the SPSS package on the mainframe and obtain the results on hard copy. My conversion of data has been quite phenomenal given the wide variety of formats where relevant information is found today. Unfortunately the configuration of the technical systems made available to me allows me only to present my work in print form.

Next step - merge the information. I book a PC and find out that the package I used for my bibliography is not an integrated package so my word processing and graphics and data base are processed separately. I am also limited by the technology available on campus to presenting a traditional paper as my end result - my scholarly imagination suggests that an integrated product with still images of cell division, audio tracts of the expert describing key processes and events, and the talking head of the pioneer in my field (long since dead) describing the key results of his historic experiment, would have radically enhanced my ability to communicate well. I might have accomplished this by the use of the current communication media.

I share with many students a questioning intelligence and am a successful product of the broad objective of my western education system. This questioning motivates me to ask how can I do this better, faster, and communicate my findings exactly and precisely. I examine my information gathering and processing journey and see already that the key technology in that journey utilises the visual display unit for all graphics. My software package promises me in glowing terms that I have entered the era of the workstation. Why could I not have rummaged through the textual, numerical, graphic and audiovisual information, pulling relevant data from global sources down line to my workstation where I manipulate, organise and publish it? Has my institution a comprehensive strategy which will allow me to exploit the current potential of information systems and communication technology? If it has, did it consult me as a user to ensure my major interests are known - my desire to utilise my time efficiently in my pursuit of relevant information to support my learning.

### **The future: Considering alternative strategies**

Neff (1986) suggests a strategy for the University of California at Berkeley one that shows territories of function disappearing. It presents a challenge to our presently motivated managers whose organisational hierarchy tends to protect functional groupings rather than promote systems planning and development based on user requirements.

The following is Neff's description of Berkeley's strategy:

One campus communications network will connect everyone, with standards (and emerging standards) for interfacing devices:

- A three-level computing hierarchy ranges from the individual workstation to the department data-sharing and server systems to the campus-wide data band and supercomputer level, including off-campus networking access and services.

- Only a few types of workstations are planned and they all have high functionality and access to both campus-wide information utilities.
- The same general-purpose workstations are used by faculty, students, and administrative staff.
- All workstations have word processing, spreadsheet, data base, drawing/graphics, electronic mail and bulletin board, and communications software.
- The library is the academic information centre on-campus, and workstations are used to access library information systems.
- Administrative information is managed centrally - with uploading and downloading capabilities and is generally available to those with a demonstrated need to store and/or retrieve administrative information.
- Image printing devices are located in departmental working groups, libraries, and other convenient places. Character scanning and phototypesetting devices are available in the computer centre.
- Classrooms are equipped with workstations and computer display devices for projection.
- The curriculum is evolving to take advantage of the capabilities of information systems and technology. Proposed innovations and courseware are evaluated and if successful are disseminated. Technology transfer is an important element of curricular change.
- The computer centre provides a backup service for electronic media and archiving service for data sets. The computer centre provides hardware to individuals and departments and maintains it. The library makes software as well as other forms of information, available. Some of these items carry a usage fee.

Although Neff's statements do not represent a comprehensive strategy it is a necessary first step in articulating that more effective and efficient methods are to be planned for if communication technologies are to be used. The first managerial concept to be taken on board is that by their very nature, these technologies are interdependent in a systems sense as well as requiring a structural framework which will allow human effort to be effectively coordinated to utilise them.

Neff does not make it clear in his paper whether the communications network he envisages for Berkeley is to be a carrier of audiovisual, audio and visual information thus tapping the total communication media of our times. In such a work station scenario the data source is transparent to the user. The technological and systems solutions which would allow an LAN to be such a carrier are not fully developed at this time. It is up to us in this industry to articulate our user's requirements to the communications industry.

Certainly a closer relationship between the computer centre and the library is desirable. Such a relationship, in my view a learning relationship, is one which facilitates the dissemination of the collective expertise so that personnel have the skills to pursue the same service goals. Library staff then could bring systems analysis/engineering knowledge to their planning framework and computer centre staff become more oriented towards the information requirements of the user.

Certainly, the notion that managerial skills are function independent needs examination. Current assumptions among educational service managers that managerial skills are transportable and that a manager of process work in a manufacturing plant can successfully move to the management of media production may be reactionary. It is fundamental to system design that the components of a system (functions) are interdependent, that any change in any component or part of the system will affect not only the output but the mode of action by which the system fulfils its purpose.

My role-playing as a user moving from pre-digital systems and back again, my inability to really exploit the full potential of current communications technology, my frustrated attempt to utilise workstation and communication software, prompts analysis of how these inherently interdependent educational services are dysfunctional. I can only conclude that the system requires analysis. In a classic systems sense it needs debugging.

I suspect that an outcome of analysis of our education support services might be that a more appropriate relationship between the managerial and task performance levels within that system is required, and that the nature of the relationship must be identified. It may be that the manager will need to take into account a knowledge of task level detail and how this level interrelates with other components of the system. A more relevant managerial posture may be required, and this posture must be defined. It may be that the successful provision of education support services is dependent upon an achieved symbiosis of human effort and machine performance in meeting the requirements of our users.

### Reference note

1. For the purposes of discussion three definitions have been employed in this article: "form" has been defined as the mode in which a thing exists or manifests itself, "function" as the mode of action or activity by which a purpose or role is fulfilled and "role" as what is expected of the appointee to a position.

### Reference

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