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Designing Library Space to Facilitate Learning: A Review of the UK Higher Education Sector

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This paper analyses the complex and sometimes competing issues involved in designing library space to facilitate student-centred learning within the UK Higher Education sector. Encompassing a critical review of the subject literature, this paper describes and explains the profound effects that pedagogical and technological change together have for library space design and management. The changing role of academic libraries in student learning is explored, as are the qualities and features of academic libraries that facilitate traditional and digital forms of student learning. The literature review established that academic libraries must cater for an increasing range of learning activities, and provide space conducive for independent and collaborative learning using traditional materials either separately from, or in association with, electronic resources. New modes of learning and changes in student working practices were identified, especially resource-based learning and digital literacy developments. Modern academic libraries must rationalise and respond to pedagogical and technological changes and foster changing and continuing forms of student learning to enable students to achieve their best work and ready them for their post-qualification vocation. To achieve this, librarians must consider remodelling existing library space and, in concert with architects and institution administrators, design new libraries fit for twenty-first century learning, teaching and research.

Introduction

The research paper is concerned with designing library [1] space to facilitate *learning*, or more particularly, to facilitate *student-centred learning*, and focuses on the implications of the change in emphasis from teaching to learning within the UK Higher Education (HE) sector for the design of library space. McDonald (1996, 3) argues the trend towards *resource-based, collaborative,* or group-based, *learning "...* has shifted the balance from teaching in classrooms to learning in libraries", with important consequences for space management. Brindley (1995, 4), in acknowledging the importance of changing patterns of student learning on library accommodation, argues "We are all guilty of not paying enough attention to implementation matters in a complex and holistic way demanded by the challenge of student-centred learning." Furthermore, Brophy (2002, 5) agrees, "Academic libraries must make every effort to integrate their services into the mainstream learning, teaching and research of their institution." The research will seek to address these issues by examining the literature to delineate the changing role of libraries in learning, and the qualities and features of academic library space that facilitate student-centred learning.

Brophy (2002) cites the widespread adoption by institutions of Managed Learning Environments (MLEs) and the consequent need for libraries to coordinate all resources (notably electronic, printed, *and* spatial) which support the 'language of pedagogy', "... tailored to the learning styles of students and the learning modes which teachers have adopted" (Brophy, 2002, 5). In this endeavour, Noon (2002, 12), University Librarian at Coventry University, recognises that the University has invested enormously in both building the new award-winning Lanchester Library and in de-

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veloping World Wide Web Course Tools (WebCT) as the MLE "... but we are still struggling to see how the Library in both traditional and electronic manifestations will interact with this."

The changes in teaching and learning are inextricably linked with the advances in information and communications technology (ICT). The growing dominance of electronic resources and networked information has forced library and computing personnel, who have traditionally worked apart, to collaborate. Some institutions have adopted convergence, the bringing together of library and computing services, with library and computing accommodation collocated for user convenience. Moreover, SCONUL's [2] vision (2001) for the academic information services in the year 2005 emphasises the development of the Web as a medium for communication and interaction. SCONUL (2001) expects the shift from teaching to learning to continue throughout the HE sector with libraries functioning as community hubs and social centres delivering essential services in support of student learning, thus retaining their importance as a physical place and repositories for a diverse range of resources, support services and working environments. The development of Web portals, especially in the context of MLEs, has significant implications for deciding the appropriate balance between computer workstation provision and other study space types, especially with 'new opportunities for imaginative use of space' presented by students' use of their own portable computer equipment (notably laptops) and wireless technology developments.

In evaluating the profound effects that pedagogical and technological change together have for the design of library space, the research follows the example set in SCONUL's vision (1998) for the academic library in the year 2002, which "... does not claim to be a complete or comprehensive picture; rather it attempts to highlight key themes ... in order to stimulate thinking and assist corporate planning." However, Metcalf (1986, xv) provides several fundamental caveats:

> A library building should reflect the needs of scholarship, the teaching program, the relative emphasis on different subjects, and the special character and style of the institution. Furthermore, the building reflects the individual philosophy and practice of library service at the time that the building is programmed and designed. It is conditioned by its particular site and neighbouring buildings. Finally, each library reflects some of the architectural concepts and construction practices of its particular design team and era.

Individual institutional library design solutions are therefore not necessarily transferable to other situations. Brawne (1997, 6) suggests that buildings of the last decade act as 'architectural explorations' of the pedagogical and technological challenges faced by library designers, and so "... no single example could be said to be definitive." The heterogeneity of the HE sector therefore confirms, "no single blueprint and no simple prescriptions can be developed" (Joint Funding Councils 1993, 25). Consequently, in attempting to apply 'general principles regarding accommodation and relationships' (Metcalf 1986), readers must seek to understand, perhaps through case study research, the special position of their own individual institutions, particularly the institution-specific learning, teaching and research objectives.

The research stresses the 'functionality', or fitness for purpose, of buildings for their users rather than the principles of 'ease of use' and 'economy of operation' (McDonald 1997, 191). Fundamentally, this paper is concerned with improving the quality of the learning environment in academic libraries, emphasising the design of library space for the benefit of its users in their pursuance of student-centred learning. The research is *not* concerned with a number of significant factors that can influence student learning, such as signage, aesthetics, lighting and ergonomics, amongst considerable others. The functionality of these factors remains reasonably constant regardless of pedagogical and technological change, and so they are discounted.

Rationale

Since the early 1990s, the many, varied and competing demands for limited space within academic libraries including, not least, book storage, study space, and personal computers, has made much existing library accommodation inadequate to meet users' needs. Unfortunately, librarianship writing has tended to focus on librarians managing people, services, resources and time, but not space. McDonald (1995, 23) argues this is a shame because "well-planned space enables the library to fulfil its mission and pervades all other ser-

vices." A great deal of professional attention has focused, for example, on the recommendations of the Follett Implementation Group for Information Technology (Joint Funding Councils, 1993, 73), neglecting the Follett Report's financial support for a multimillion pound programme to build, remodel, or adapt library space (1993, 7). Law (1995, 15) agrees, suggesting, "This large extension of library space is one of the most important – but least remarked upon – outcomes of Follett." Providing additional reader places was seen as an urgent priority, but, moreover, so was the need to respond to the dramatic shift from teaching to learning across the HE sector, and the rapid advances in information technology and networking.

The quality of the learning environment is, according to McDonald (1995), a crucial part of the students' experience, especially if students are spending more of their time studying in libraries rather than attending lectures (in part, as a response to the substantial growth in the UK HE student population during the 1990s (Bulpitt 1999, 245). The design of library space can therefore either aid or impair the ability of students to achieve their academic potential. Olley (1997, 12) supports this argument, "The spatial architecture of knowledge might be revelatory or limiting through juxtapositions and correlations." Moreover, Olley (1997, 12) adds, "The reception of a text might further be conditioned by the physical and psychological environment in which it is read." The task for library designers therefore is "to establish a human-centred environment, rich in choices which appeal to the senses [physiologically] and psyche [psychologically]" (Olley 1997, 12). In support, modern academic libraries, according to Worthington (1994, ii), "must provide spaces that create identity, absorb changing technology and provide easily accessible spaces that enhance human [and information] exchange." In other words, academic libraries must cater for an increasing range of learning activities.

Reports of the death of physical academic libraries have been greatly exaggerated; at least for the foreseeable future, 'the library will have walls'. Brophy (2000, 162), for example, in identifying deficiencies in discrete print-based or electronic libraries, suggests the best approach "may be to develop services which draw on the best of both the traditional and electronic worlds." This has led to the concept of the 'hybrid' or 'integrated' library, where "new modes of service delivery will coexist with traditional print-based collections" (Corrall and Brewerton 1999, 212). Therefore, library buildings must provide space for continuing and expanded functions, especially "instruction and interaction, reflection and refreshment" (Corrall and Brewerton 1999, 212).

From teaching to learning

The trend towards resource-based learning suggests that the resources used exert a major influence on the ways teaching and learning are accomplished. Beswick (see Edwards, Day and Walton 1998, 73) reports that resource based learning has a variety of meanings, although essential to all however is "the assumption that the student will learn from his own direct confrontations, individually or in a group, with a learning resource ... rather than from conventional exposition by the teacher." Hardwick (1996, 104) argues this "raises the question of the degree to which our existing university libraries provide either suitable or appropriate 'learning space' for a diverse range of resource-based activities." A key objective of a resource-based learning approach is that students should acquire transferable skills in the areas of resource use, critical analysis and effective exploitation. Consequently, Hardwick (1996, 107) asserts, "librarians need to be schooled in the pedagogical issues implicit in designing a learning environment that promotes reflective and critical thinking." For effective learning to occur, as recognised by Dowler (1997) and Wilkinson (1997), students must have the necessary space to actively engage in reading, discussing and problem solving, and resources and services must be made available with some thought to how learning really occurs.

Digital literacy

HE students require libraries (and librarians) that enable information *access* and facilitate information *use*. To support use, libraries must be designed with 'the mechanisms of use in mind' (Brophy 2000, 179). Information *use* can include various processes, including extracting and analysing text from electronic journals, exploring hypertext links and storing files and Web page 'favourites'. Lyman (1997, 136) asks

> How will the epistemology of scholarship and learning change as technology becomes a necessary part of reading and writing and as new rhetorical structures (like hypertext and databases) create new relationships between reader and text?

Because the number of information finding tools, such as library catalogues, CD-ROMs and databases, is escalating, and diversity in patterns of access represents a barrier to use, hybrid library projects, such as HyLiFe (Hybrid Library of the Future) (Martin 1999, 11), have tended to focus on building navigable 'portals' or 'gateways' using Internet technologies, rather than building integrated services that make best use of physical space.

Heseltine (see Rusbridge 1998) argues that ICTs enable the integration of information and work so that they no longer have to occupy separate spaces. Faced with an electronic journal article, for example, students may want to:

- read and annotate it on screen
- follow hypertext references
- print and/or save it
- copy and paste text into another document
- send it to peer group members
- discuss and debate it

These information actions, adapted from Rusbridge (1998), suggest information in digital form can affect the ways students synthesise knowledge. Rusbridge (1998) argues that "users must be able to access the information while carrying out some other activity", such as writing an assignment. In support, De Castell (2000, 365) argues libraries must 'nurture literate communities', and suggests that new digital literacies are required to use emerging technologies. This means libraries must be re-designed and work practices re-configured. Bawden (2001) provides a comprehensive discussion of information and digital literacies, but suggests that hypertextual and multimedia literacies for an information age have not been discussed as much as their importance deserves.

Traditionally, students were trained to absorb information, to analyse it, to synthesise it and to reproduce it. Today, students are expected to explore, to experiment, to solve problems, to work in groups, to think laterally and to interact creatively. Libraries must shape their learning environments according to this change in teaching methods. Heseltine (see Criddle, Dempsey and Heseltine 1999, xix) argues "the challenge is not to create digital libraries, but to envision integrated learning environments which are designed for the learning styles of a digital generation." Therefore, libraries must now provide study spaces that enable students to conduct the near synchronous acts of information access, reading, evaluation and writing.

The library's role in learning

Dowler (1997, 98) equates the modern physical academic library with a 'knowledge gateway' that provides a constellation of services and spaces dedicated to learning. The 'library as gateway' will have a number of defining elements including:

- electronic access to information
- services to support access to, and effective exploitation of, documents
- "a flexible physical space that supports student learning through individual study space, small group and class study, and demonstration facilities"
- an organisational structure capable of co-ordinating functions and services

Therefore, the fundamental challenge for the gateway library, if it is to be an active partner in contributing to the educational mission of the parent institution, will be to provide the space and services to enable students to integrate the use of information in all formats, preferably without disturbing other learners.

Users will be required to learn, and librarians must be able to teach, information management and evaluative skills. World Wide Web users, for example, will need to know how to select appropriate resources through an understanding of quality control issues. Lyman (1997, 145) warns that "students have learned about digital technologies ... in the commercial world of entertainment, in which images and information are to be enjoyed but not analysed in any scholarly sense." Lukez (1997, 17) asks, "Where does information/knowledge and entertainment begin and end, or are the boundaries forever blurred?" The reports in the literature of noise generated by library PC

cluster users suggest that the marriage between information and entertainment presents a substantial problem for library space designers to address.

Established library design considerations

Brawne (1997, 8) forewarns that library "design considerations go beyond those that have to do with the main function of the building." One frequently described concern relates to location and context, especially the symbolic aspect of the library building. The UK HE sector is increasingly competitive, and new library buildings are often the most spectacular on campus, serving to attract prospective students. For example, Ashworth et al. (1997, iii) suggest "there is no doubt that the appeal of the [Sheffield Hallam] University is greatly enhanced by the [Adsetts] Centre." Furthermore, King (1998, 30) suggests "the library's need to maximise flexibility and functionality is sometimes at odds with the architect's desire to make the building an architectural statement." Therefore the design process is frequently characterised by 'tensions and trade-offs, including differences in priorities between librarians (concerned with function and use) and architects (interested in form and look)' (Corrall and Brewerton 1999, 218). Ideally, libraries should be designed to serve its population rather than to impress them, although according to Edwards (1990, 2) "beauty and practicality are not incompatible."

A list of important qualities for academic library buildings was devised by Harry Faulkner Brown (1979), and adapted by Andrew McDonald (1997) to take into account changes in the library service environment since. McDonald (1996) has also detailed quantitative library space standards, revised by Shepherd (2000) for students with disabilities. In terms of designing library space to facilitate student-centred learning, the *flexibility* (Faulkner Brown 1979) or *adaptability* (McDonald 1997) of space is a key criterion. If the budget permits, key flexible/adaptable features should include:

- as few permanent internal walls as possible
- the systematic zoning of areas for different activities using 'screens' in the form of shelving, furniture, or, increasingly, glass walls
- an extensive and accessible network and power grid to enable the connection of reader places
- load bearing floors sufficient for book stacks throughout the building

Some libraries housing predominantly computing resources have been constructed to office, rather than traditional library, floor loading standards, which represents a compromise between building flexibility and budgetary constraints.

The provision of *varied* study accommodation is also essential if libraries are to satisfy the differing needs and preferences of individuals and groups, undergraduates and researchers. McDonald (1997, 196) suggests some readers like an 'active' or noisy social learning environment, whereas others have a preference for quiet study places with good acoustic and visual privacy. This can be achieved to different degrees with table dividers, book stacks, screens and carrels.

Hybrid library qualities

Corrall and Brewerton (1999, 214) provide a useful summary of common assumptions about libraries as future learning environments:

- *Learning is more collaborative* – thus a need for 'collaboratories', such as group study tables and rooms with shared access to technology and presentation facilities
- *Learners have different preferences* – differing learning styles mean a need for study space varieties and 'zoning', such as quiet private areas, and busy social areas with low-level seating and tables, and with refreshment facilities
- *Technology is developing rapidly* – thus a need for facilities for continual training and retraining of users in large classes, small groups and as individuals
- *Access to network resources is universal* – hence a need for cable management for wired-up study places (both computer workstations and plug-in points for laptop computers).

According to Buxton (1998, 16), early examples of 'integrated' buildings, in a desire to emphasise ICT credentials, "shunned the traditional library and embraced open-plan office styles and sociable atrium spaces." Regrettably, this approach "contradicts one of the most important principles of designing a library, which is not to mix up circulation spaces and quiet contemplation" (Buxton

1998, 16). In addition, the literature suggests many buildings designed 30 years ago have proved difficult to adapt and incorporate adequate and appropriate features such as wiring, group study areas, and training rooms. Buxton (1998) reports that architects for Liverpool John Moores University's second new learning resource centre (The Avril Robarts LRC, opened in 1997) learnt some critical lessons from the first (The Aldham Robarts LRC, opened in 1994). Designed by the same architects, the second LRC "went for a much higher proportion of individually screened study spaces", partly due to student feedback (Buxton 1998, 19). Revill (1997, 262–3) describes the Avril Robarts LRC's inclusion of 'private study PC equipped spaces', plus the adoption of the principle of 'the higher the fewer, the higher the quieter.'

Long, architect for the University of Brighton's Aldrich Library, opened in 1996, suggests "The development of open-plan libraries has increasingly led to noise problems, especially as it seems to coincide with a tendency for students to work in (often chatty) groups" (see Moon and Long 1997, 31). Consequently, one design feature included within the building was 'group study rooms.' Students at the Adsetts Centre, Sheffield Hallam University, reported group work noise as undermining private study (Ashworth et al. 1997). As a corrective, the Centre's top floor has been set aside for quiet study although library staff reported this required 'policing', and students had requested 'study cubicles' (Ashworth et al. 1997, 28). (See Bulpitt (1999) for further discussion regarding the visually exciting Adsetts Centre).

Hybrid library features

What are the design features that symbolise the library's changing role from custodian to gateway, and which effectively bring together users and resources?

Computer workstations

ICTs and MLEs play a leading role in providing access to information resources, and therefore students' access to computer workstations is essential. Unfortunately, noise, particularly from computer clusters and the users themselves, is an increasing problem in libraries (McDonald 1997). Consequently, many libraries have arranged potentially noisy PC activities away from quiet study areas. Ideally, from the perspective of user convenience, integrated services should allow students to seamlessly access all available electronic services and resources and Microsoft software applications (or their equivalents) from every computer workstation. However, providing sufficient workstations to meet all users' varying needs is a significant dilemma. Moreover, McDonald (1997, 201) asserts "there is an inevitable tension between achieving the maximum number of machines and creating an attractive space conducive to learning." Large PC clusters are said to produce 'a surprising amount of noise' (McDonald 1997, 201). Corrall and Brewerton (1999, 218) agree, suggesting a decision to maximise the number of computer places perhaps makes the learning environment 'less conducive to study'. McDonald (1996, 3) also recognises that the introduction of computers means the traditional reader table size has become 'grossly inadequate' to provide space for books, computers and readers' papers.

Zones

The literature recommends different student activities have designated separate zones. For example, quiet study areas should be situated away from noisy high traffic and group study areas. Librarians need to analyse the functional relationships between student activities, and the potential disturbance caused to other learners.

Training rooms

Bazillion and Braun (1995, 3) assert that a 'user instruction room' belongs in every academic library to enable librarians and academic staff to teach users information retrieval and evaluative skills. Casey and Crompton's (2000) *Learning space design* work provides contemporary guidance for 'designing room spaces that incorporate new technologies'.

Service points

The number, role and positioning of service points can significantly affect users' learning. Traditionally, information or reception desks handle

general enquiries, directional and quick reference, whereas reference or subject enquiry desks offer more in-depth inquiry and consultation services. Technical help is often available by approaching a further service point. The potential for user confusion in terms of which service point is appropriate for which question is exacerbated by the presence of several service points, unless users' expectations are properly managed. A single help desk approach is often rationalised in terms of user convenience. Sheffield Hallam University's Adsetts Centre, for example, provides generic information help desks (Ashworth et al. 1997, 7). The literature recommends subject enquiry desks should be clearly visible and close to the relevant collections.

Wired-up study places

A frequently expressed design objective is to wire-up as much space as affordable with network and power ports to maximise the building's convertibility but also, in part, to allow laptop computer use, although associated keyboard noise and need for sound proofing in quiet study areas is an important concern. Bazillion and Braun (1995, 44) emphasise the need to accommodate the use of computers (including laptops) with network access built into study spaces; "study spaces thus become self-contained work areas in which research and writing may be done with relative ease."

Varied study space

Group-based student learning requires tables to seat approximately six to eight students, within perhaps soundproofed rooms with computer and network access. In addition, Brawne (1997) expects libraries to contain spaces that delineate the activity zones of individuals. The carrel, Brawne (1997) suggests, is an important example of such delineation because it provides a personal or individualised space within a larger whole. Brawne (1997) does not believe that an electronic source as an alternative to a book alters the person-to-information relationship, and the carrel concept 'remains entirely appropriate'. However, many new libraries have adopted an open-plan approach, creating large flat floors providing flexible accommodation options. Brawne (1997, 7) argues that "the resultant undifferentiated spaces have not always celebrated the act of reading and study." There is a need for varied, or a 'family' of, study spaces, providing, through structure and materials, places with degrees of openness and enclosure.

Social spaces

Library users' ready access to social spaces with food and drink facilities is important because refreshment is essential to sustain learning, and is more essential if students are spending longer studying in libraries. Ashworth et al. (1997, 10) recommend the addition of a relaxation/informal area within their library as a means of addressing the noise problems associated with students socialising in the building.

Turning theory into reality

A university's library can ultimately represent a position where 'the institutional dog wags the Library tail', and a compromise between what the Librarian and architect prioritised at the time of the building works, and what the University could afford. Librarians have the unenviable task of trying to balance and fit often contradictory needs. Library design is also made more difficult because of diversity between and within individuals, groups and subjects, and because of different requirements at different times depending on the purpose behind information access and use.

There are many new academic library buildings in the UK from which to draw design inspiration and important lessons. The research recommends librarians, who are faced with designing afresh or remodelling existing accommodation, visit as many new academic libraries as possible to observe learning, teaching and research in action, and also to talk to colleagues about how the space works in practice. This is the approach adopted by the Open University's (2001) New Library Project team who have undertaken a number of visits to new libraries to gather information and ideas regarding the multifarious design solutions to integrate the functional requirements of libraries. Amongst those listed are Coventry University's new Lanchester Library and the redeveloped Lionel Robbins Building at the London School of

Economics (LSE). (SCONUL's Building Projects Database [3] and SCONUL's Library Design Award [4] are key to locating further examples of new academic library buildings).

The University of Bath's Library, built originally in 1971, was extended and refurbished during 1995–6 by Alec French Partnership architects to form a Library and Learning Centre (LLC), and presents an interesting case study. As identified by Powell (2000, 63), the LLC possesses the following important hybrid qualities and features:

- As an integrated facility, books, periodicals and approximately 380 personal computers (PCs) are collocated for user convenience 24 hours a day during semester time.
- Staff have sought to establish zones to delineate and physically separate various activities, notably the division between PC areas, quiet study areas and group study areas, and their respective acceptable levels of noise.
- Each zone accommodates different study space. The PC areas, for example, provide open-plan workstations where informal group work is permitted. By contrast, the quiet study areas, largely composed of carrels, are essentially quiet reading areas for students using printed materials or revising.
- An information point is provided on each of the three subject-collection floors. Through placement and design, these points provide a very visible source of assistance and group together enquiry-generating features such as catalogues and 'quick reference' materials. On the ground/entrance floor, staff from the Library and the University of Bath Computing Services work 'shoulder to shoulder'.
- A social space is also provided where students can take a break from studying and chat with friends and refuel by eating and drinking.

Although the LLC demonstrates flexible and varied design qualities, Howard Nicholson (1999), the University of Bath Librarian, has identified a number of issues and problems caused by integrating a large information technology facility into a traditional academic library, and the 'noisy' effects of encouraging informal group work at the open-plan PCs. Nicholson (1999, 87) admits "there is no question that we at Bath have gone too far towards the Reuters newsroom or currency trading floor." Powell (2000) argues that the LLC, in support of the University's strive for excellence in both research and teaching, must continually seek to provide environments conducive for two distinct sets of learners – researcher and undergraduate. In other words, "study space that enables students to conduct electronic as well as desk research, and group study space that facilitates students' development of the analytical, presentation and communication skills required by employers" (Powell 2000, 72), and the University of Bath's LLC has achieved some success to this end.

In March 2001 the British Library of Political and Economic Science (BLPES) at the LSE – housed in the Lionel Robbins Building – was redeveloped after a considerable 18 month redevelopment programme by architects Fosters and Partners. It houses 1600 study spaces including 490 networked IT workstations and 226 laptop drop-in points, plus twelve group study rooms and a research area on the fourth floor. Foster's design solution maintains the "basic fabric of the awkwardly shaped building (on plan made up of two dissimilar triangles joined together)", but has "converted the old lightwell around which the library once revolved into an atrium, a great cylinder driven down to the basement and bringing daylight into the heart of the building" (*Light read* 2001, 76). The cylinder, with its 'helical ramp spiralling around a pair of glass lifts', circulates people around the building. However, according to Jean Sykes (2001, 2), LSE Librarian and Director of Information Services, the "general concern about noise in an open plan design did not materialise." This was in part because the study areas were placed deliberately at the perimeter of the building, which remain quiet 'despite the activity in the central circulation area'. The blocks of book stacks leading away from the atrium act as a 'sound barrier', absorbing noise.

Many of the 490 IT workstations are located in the building's basement, and consequently 'levels become quieter as you move up the building', and 'there are silent retreats enclosed by glass walls' (*Light read* 2001, 79). The workstations provide support for 'the fast developing Learning and Teaching developments in the School', with "more academic staff every term deciding to incorporate electronic sources and methods in their courses" (Sykes 2001, 2). The heavily used workstations are separated by screens to break up the open plan environment. Workstation tower units are positioned beneath the desk surface, and workstation monitors are elevated off the desk surface on a glass shelf, thus allowing more desk

space for the integrated use of hardcopy materials with electronic resources. This supports Akeroyd's (2001) call for spaces that are 'conducive to long periods of screen use' and enable 'new paradigms of searching'. *Light read* (2001, 79) concludes that the redeveloped LSE library learns the lesson of designing 'resoundingly' noisy open plan study areas.

Conclusions

In general terms, King (1998, 30) asserts hybrid libraries are multifunctional facilities, and as such are "becoming noisier places as teaching and learning methods change, and group interaction and discussion emerge as important components of the learning process." However, areas for individual concentration and private reflection must remain. The picture is complicated by the fact that some academic institutions focus on undergraduate teaching and learning, whereas other universities focus more distinctly on research, and undergraduates and researchers have different, but not mutually exclusive, requirements. Undergraduates are more likely than researchers to engage in resource-based and collaborative learning, and so will require group study space. Researchers generally study alone, and require quiet space to read and contemplate.

The literature indicated that student-centred library space is characterised by two *qualities*:

- flexibility – the ability to reconfigure layout to match users' changing requirements
- variety – the provision of a 'family' of spaces that facilitate different forms of learning

It is assumed that learning will become more collaborative, learners have different preferences, technology will continue to develop and network access to information will be imperative. Thus, in addition to providing ready access to large book and periodical collections, hybrid library *features* will include:

- group study areas, whether separate rooms or zoned, with ICT capabilities
- varied, and zoned, study accommodation, and social space
- training facilities and help desks to demonstrate systems, services and techniques
- computer workstations and wired-up reader places

The shift from teaching to learning has meant students spend more of their time working independently and collaboratively with their peers – often in libraries – rather than attending lectures. Libraries must therefore provide 'learning support', particularly creating and managing an environment conducive for both individual and group study. Librarians must provide specialist support in information access combined with an understanding of how the information will be used. Librarians must facilitate students learning of information skills, and integrated learning environments must be designed for the learning styles of a digital generation and for digital literacy. The qualities and features of student-centred library space identified above facilitate learning because they enable individual, and groups of, students to integrate the use of information in all formats – without disturbing other learners – and with specialist staff support if required. In particular:

- group study areas facilitate collaborative learning, and students' acquisition of transferable interpersonal skills required by employers
- varied, and zoned, study accommodation, and social space supports students differing learning styles
- training facilities and help desks teach students how to adapt to the increasing computerisation of documents, and train students to recognise the quality divide between digitised entertainment and digitised academic publications
- computer workstations enable students to access networked documentation

All these features should be provided in an integrated environment to facilitate students' access and use of information whatever its format, in an atmosphere conducive for private and collaborative study. Changing work practices, particularly the gradual realisation and adoption of digital research methods, means libraries must change their design and management of space to prevent mismanaging users' expectations and learning opportunities. Unquestionably, it is the responsibility of hybrid library designers to foster both collaboration between students and collaboration between students and information.

Freeman (2000) asserts that librarians, architects and administrators 'must first look at the person for whom we are designing,' in particular study how students access and use information collec-

tions and formats, but also how students socialise, interact and collaborate with fellow learners to exchange information and create knowledge. Freeman (2000, 171) suggests the Library will maintain its role as preserver of information, but must also assume 'the greater role of generator, exchanger, and server of information', providing services and an environment for learning. An understanding of the role of the library in achieving the education mission of the institution is therefore essential. Pedagogical and technological developments will continue, and the design of academic libraries must continually evolve to keep pace with users' needs and changes in working practices.

Notes

1. The terms 'library' and 'libraries' have been used here to conveniently denote the full spectrum of HE library and information service buildings whatever their formal title. Throughout the UK HE sector, libraries have been replaced with 'Learning Centre' variants, reflecting perhaps the learning rather than teaching or research emphasis of institutions.
2. The Standing Conference of National and University Libraries (SCONUL) changed its name in 2001 to the Society of College, National and University Libraries in order to admit members from colleges of higher education.
3. SCONUL, 2002. *SCONUL Building Projects Database* [online]. Available at: URL: http://www.lgu.ac.uk/deliberations/sconul/ [Viewed 22 March 2002].
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