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and Management fund “Learning Landscapes in Higher Education”³, a project intended to promote collaboration between academics and estates professionals in the creation of new learning spaces.

The JISC has been at the forefront of encouraging creative thinking in learning space design; its publication *Designing Spaces for Effective Learning* (JISC 2006) suggests the mantra for space as: Flexible, Future-proofed, Bold, Creative, Supportive and Enterprising. This report is only part of the body of work funded by the JISC with later projects running under the e-Learning and Innovation Programme (now closed).

This work, alongside other initiatives such as the Designing Libraries website⁴ which began as a collaboration between the University of Aberystwyth, the Museums, Libraries and Archives Council (MLA), the Chartered Institute of Library and Information Professionals (CILIP) and more recently the Society of College National and University Libraries (SCONUL), together with articles from practitioners, contributes to the growing body of work on learning space, providing guidance for architects, estates personnel, and librarians in planning and implementing new learning spaces.

Learning Spaces: The Library Context

Over the centuries our libraries have responded to political, technological and pedagogical changes in the environment to remain relevant and at the heart of the learning experience. Recent drivers for change have been: increasing student numbers, ubiquitous technology, the rise of the so-called digital native, changes to learning, teaching and assessment and of course the growth in e-information.

The past few years, prompted by these drivers, has seen the rise of the information commons and learning commons concept, both overseas and in the UK. Lippincott (2007) suggests that there is no commonly accepted definition of these terms but argues that they have in common access to content (print and electronic), access to power, hardware and software, and lastly access to assistance in the use of technology and content. These are seen to be exciting, stimulating spaces lending themselves to collaborative and even social learning (Bryant et al. 2009). At the same time however our customers still need access to what might be viewed as traditional library spaces, offering opportunities for individual learning in quiet or silent environments (Beard and Dale 2008). We also have to consider the needs of researchers working in both physical and virtual library spaces, and the services and roles required to support them in emerging environments. The Association of Research Libraries (ARL) gives a thorough insight into the facilities required by researchers.⁵

3 <http://learninglandscapes.blogs.lincoln.ac.uk/>.

4 <http://www.designinglibraries.org.uk/>.

5 <http://www.arl.org/rtl/space/index.shtml>.

That the library remains at the heart of the academic experience even in a predominantly digital environment is evidenced by the various exciting new libraries and refurbishments which have been completed since 2000, with further developments planned for the future.

Learning Spaces: The Institutional Context – Case Studies

So how have the new libraries and refurbished libraries responded? How have they reinterpreted library space to bring it up to speed with the demands of 21st century teaching and learning, creating new and interesting offerings of learning spaces to their customers?

What has become evident through these developments is a strategic response to the specific institutional contexts. If one looks across recent developments they are not generic clones of each other; each learns from what has passed before and with stakeholder consultation develops a space response to fit their institutions' needs.

But the physical space also demands a rethink of service strategy – some institutions have also taken the opportunity to reconsider their approach to customer support and service delivery within their innovative learning spaces. There has been recognition that this has made a difference to the uptake of new provision, guiding the end user to effective use of the development.

To illustrate how libraries have developed spaces for the digital age, four libraries have been selected to serve as case studies; University of Warwick, University of Leicester, University of Nottingham and University of Edinburgh. Each offers its unique interpretation of space for learners in their specific context: at the same time common threads are evident, offering insights into trends in learning space development.

Case Study 1: University of Warwick: Learning Grid and Library Development

With thanks to Robin Green of the University of Warwick who provided the information on which this case study is based.

The original library was built in the 1960s and was considered to be one of the key buildings of the 1966 Development Plan; it had remained almost unmodified since that time. Since 2004 a series of projects, designed by architects MJP, have led to the 'reinvigoration of library services and learning environments at Warwick'.

These projects have included the Learning Grid (2004) which is a development occupying a space of about 1,350 square metres on two floors in University House. It has capacity for approximately 300 students. Managed by the library and open 24/7, the Grid provides flexible, IT-rich space supporting independent learning. A wide range of equipment is available – scanners, electronic whiteboards, wireless

network, video cameras, networked PCs. Space is open plan but rooms for formal presentations are also available. Permanent staff support students alongside student advisors. Limited eating and drinking is allowed in the Grid. The Grid was used as a space exemplar by JISC in its *Designing Spaces for Effective Learning* publication.

In addition to the Learning Grid, Warwick has more recently redeveloped 40% of the library building, including the Teaching Grid and Research Exchange (2008). The development was funded by the University, Higher Education Funding Council for England and The Wolfson Foundation.⁶ The vision for the library redevelopment was: 'To provide a stylish, iconic, inspiring, user-centric, comfortable, colourful, visually exciting, fun, attractive, welcoming, varied and flexible space that celebrates intellectual activity and learning'.

The deliverables for the project were, a more attractive entrance floor incorporating:

- a café;
- social learning space and increased floor space for users;
- a more open and legible building by removal of visual and physical barriers;
- colour coding and improved signage;
- attractive and welcoming study environments supporting different modes of teaching, learning and research;
- improved user facing support;
- managing growth in book stock;
- 200 new study spaces in a range of layouts with access to multimedia resources;
- creation of two spaces, one teaching and the other postgraduate study focused;
- an IT services help desk;
- a new 100 seat lecture theatre;
- two PC suites (each with 85 computers) and 24-hour access.

Refurbishment has extended the IT capability of the building to accommodate known and anticipated IT developments, including a PA system, wireless and Radio Frequency Identification (RFID). Within the library there is a combination of fixed IT and multimedia workspaces (plasma screens, SmartBoards, DVD TVs), round tables for group work, and soft seats fitted together to make angled sofas with integral power and data points as well as swivel single user laptop tables, plus high long tables with padded bench seats. These provide a wide range of layouts with some flexibility for users to move the various types of chairs and some tables around. The space is open plan and could be reconfigured with little expense. Though the furniture is good quality (much of it Steelcase), it has

6 <http://www.wolfson.org.uk/>.

suffered at the hands of the students – broken legs, swivel tables bent because of excessive weight on them, etc. This is all accidental damage with no evidence of deliberate vandalism. It does highlight the intensive use of the facilities and the need for robust furniture choices when refurbishing space.

To release space for the development a new off-site book store for less popular book stock (retrievable within one day) was put in place. In addition there has been use of compact mobile shelving in a library extension, which is proving to be 50% more efficient in space use than traditional shelving. The building has been zoned to create noisier, informal learning environments on the first two floors, with quiet and silent study space on the upper floors.

The Teaching Grid provides space for academics to explore new learning technologies and modes of delivering learning. It is being used for developmental workshops, course and events, and a range of teaching and learning activities. The facility has been designed to be re-purposed if the current function is not taken up by academics.

The Wolfson Research Exchange has been provided for research postgraduates with a focus on collaboration. It features one small lecture space which houses 90 delegates and is configurable to two or three rooms as required, a Creative Wall which is used as for projection (there is a matrix system which allows projection onto the wall from events held within the exchange or elsewhere in the University) and as a magnetic white board, break-out space, and desking for 60 students including an area for quiet study.

There have been changes to service strategy with the implementation of the new spaces in the library. The old-style issue desk is replaced by service pods with customers and staff co-existing rather than separated by nearly one metre of issue desk. Fixed enquiry points have gone, apart from the service pods by the entrance. Roaming advisors have been introduced in place of enquiry desks, dealing with all first line queries from IT to catalogue, and library advisors rather than professional librarians now deal with the front line interactions and referrals.

The deliberately open plan style of the social learning floors spawns high noise levels, and at certain times of day the library has become a very popular place with an emphasis on social engagement rather than social learning, so some complaints are received from users, academic staff and some library staff.

Currently there has been no formal evaluation of the new spaces. The growth in usage (footfall in the library is up by over 50%) has proved the success of the development, and informal feedback has been received through student liaison committees, student barometer results and other mechanisms. The new informal spaces have been particularly successful as they have provided a new type of space that was not available in the library before.

Changes to the service model and the roles involved have been reviewed with staff and refined over time.

There is a real buzz in the library – it really makes me want to come here to work. It's so much more than just a library.

Case Study 2: University of Edinburgh: Library Refurbishment

With thanks to Sheila Cannell of the University of Edinburgh who provided the information on which this case study is based.

Edinburgh University Library originally opened in 1967; the current redevelopment began in 2006⁷, and is scheduled for completion in 2012. The project budget is £60 million, funded through the capital acquisitions budget of the University, including the Science Research Investment Fund (SRIF), Tax Increment Financing (TIF) and fundraising. The currently partially redeveloped library is used as a venue for visitors, and is seen as an attraction encouraging investment in the University if not the library directly.

The architect for the 1967 building was Sir Basil Spence, the project architect being Andrew Merrylees. The building is now listed. The architects for the redevelopment are Lewis and Hickey, who are also responsible for interior design. The practical imperative for the redevelopment was the discovery of asbestos in the building. This discovery had arisen when the University was investigating its 1960s estate. A driver for development was the desire of the University to improve its estate, the library featuring as an investment in the student experience. It is now viewed as the primary academic building for learning. The phased approach to redevelopment is proving to be beneficial as changes can be incorporated in the light of living with the design. These changes are not cost neutral but the benefits are considered to outweigh the costs.

The project seeks to provide space which is flexible and capable of housing either books or study space in the future. A variety of different spaces are available to suit individuals or groups, with some spaces allowing users to create their own study environment. Seminar rooms, meeting areas and a café are provided; the last of these provides social space for relaxation.

The development has pervasive technology, allowing users access to both print and electronic resources, and to virtual help which sits alongside traditional face to face support mechanisms. Books which are rarely used are placed in on-site compact shelving, or in an off-site store.

A 50% increase in usage has been logged during the academic year 2008/09, although entry figures had declined in 2007/08 due to the disruption caused by the early phases of the work. Although not proven, there is a suspicion that the length of individual stays has increased. Spaces are now much more flexible and capable of adapting to new uses.

Furniture has been critical to the success of the redevelopment. Quality is very important; new furniture has been used alongside refurbished original desks and chairs. There is little power-enabled furniture as it is not felt to be robust. The furniture is designed to be moveable but there are limitations to this as furniture has to be centred around power provision from the floor boxes.

7 <http://www.is.ed.ac.uk/mlrp/redevelopment/Vision.htm>.

The building is fully wireless enabled with the additional provision of 450 fixed PCs, although it is believed that laptop use is as intensive as the use of these machines. Power is provided to the desktop in many areas, with a raised floor present everywhere with the exception of the ground floor. Floor boxes are also provided for power but are not successful due to trailing cables and tops to floor boxes being displaced. Different kinds of furniture are used to populate the different areas, and as the building incorporates social learning space, a menu of behaviours has been introduced through signage as a means to differentiate expected behaviours in the areas. With an extensive café as part of the redevelopment this helps define the boundaries for eating and drinking in the facilities.

To encourage use of the collections, and to make them easier to navigate, the collections strategy has been rethought. This has included the creation of an off-site store and the concentration of the high use book collection on the ground floor. The use of items from Special Collections is promoted, with inclusion of seminar rooms in their new suite of accommodation. Special Collections stores are delivered to British Standard BS5454 recommendations for the storage and exhibition of archival documents. Conservation and digitisation units look towards the future preservation and dissemination of collections.

RFID tagging of the high demand book collection has aided the move to increased self-service. Self-issue and self-return of stock has released the service desk to deal with more substantive user queries. Desks cover library, IT and e-learning questions and roving help is also in place.

One unique feature is the use of 'holopros'⁸ in the large reception area. This uses holograph projection technology and is being used for knowledge transfer in the University. They have been used to advertise such diverse topics as special collections, parasites from the veterinary department and the Chaplaincy labyrinth.

Group pods have been one of the big success stories of the project. They are intended for use by groups of three to seven people and include a PC with provision for two to three laptops to be used along with a large screen plasma display and six sockets for headphones. Pods appear to encourage various types of learning; a lot of project work has been observed, but also peer mentoring. They have been described as 'a visualization of social and collaborative learning'.

Part way through the project the library is finding that its users need strong encouragement to use collections other than those on the ground floor. Maintenance of the building and some furniture types are an issue because of the extremely high usage. The redevelopment has already been perceived as a successful University project and there has been a significant increase in usage and positive feedback from users. The library awaits the outcome of the 2010 National Student Survey, and 'Library as Place' scores in its 2009 survey have already increased.

8 <http://www.holopro.com>.

Case Study 3: University of Nottingham Learning Hubs

With thanks to Susan Storey and Valerie Housley of the University of Nottingham who provided the information on which this case study is based.

The Hallward Library was refurbished in 2006/07 with HEFCE capital monies and Centre of Excellence in Teaching and Learning (CETL) funding from the Centre for Integrative Learning (CIL) and the Visual Learning Lab (VLL). The original building architects were Harry Faulkner Brown and the open plan layout has lent itself well to the changes of use needed since opening in 1972. Alexi Marmot Associates were interior designers for the refurbishment.

Information Services (IS) at Nottingham is committed to develop and manage its library sites to provide support for research, learning and teaching. A Library Facilities Plan was developed in 2006 in partnership with a specialist consultancy, MoveCorp. The plan included an overview of expected use of library space over the next five years in relation to physical collections, study space and other facilities and services, taking into account the changing balance between printed and electronic information provision.

The Learning Hub concept emerged out of several activities, including benchmarking with other institutions, analysis of the relevant literature, and customer consultation. The results of these activities fed into the initial Learning Hub concept designs. The concept is designed to mesh with the University's e-Learning Strategy and the latest pedagogical research, for example, coming out of the work of the Centres for Excellence in Teaching and Learning.

The development utilised those areas in Hallward Library vacated by Manuscripts and Special Collections in spring 2006. IS senior managers, and staff carrying out backroom functions, had been relocated from Hallward Library to the King's Meadow Campus and this made considerable additional space available for redevelopment for student use. The Learning Hub is on two floors.

The reconfigured accommodation (about 3,500 square metres) was designed to contain a number of key features which are detailed below. Wireless technology is available throughout the building, and laptop plug in, including power and direct access to the network, is provided. Learning and assistive technologies which include equipment and software capable of supporting audio, video and interactive working demonstrate a commitment to changing pedagogy. Spaces are designed to be flexible and include chairs, tables, partitions and in some cases IT equipment, which can be moved to allow the creation of ad hoc group working. Group study and A/V viewing and areas for more relaxed working, including comfortable furniture and café facilities, feature in the refurbishment.

Users are supported by multi-skilled staff who handle both traditional library and IT-related queries. This is part of a new service concept which takes support to where the users need it rather than expecting them to seek help at an enquiry desk. The whole area is technology-rich, including fixed equipment in the bookable rooms and five 'mini-IMAX'. These are trolleys with a Smart board over a plasma screen and a PC, designed to be moved as needed. Some rooms have video

conferencing available, and one studio has ceiling cameras to record presentations. Floors have short stay PCs (most standing height, some seated) designed to be used for 15-minute slots, and these are very popular. Various rooms in the library can be booked and most are available for drop-in use when not booked.

The furniture was designed to be flexible and attractive, so it could be moved to create the space any group needed. There is a policy of not setting it back into the original layout, so the space is seen as student centred. There is selection of different seating (operator chairs, soft seating, upright chairs, pebble stools), and tables (small, high, low, large), of a significantly higher quality and price than normally used. There are power and data plug-in floor points and some provision on pillars, and the large PC tables have additional power and data provided through flip up sockets in the desks for laptop use. There is very little dedicated staff space and a reduced-size lending desk, which puts the emphasis firmly on self-service for straightforward transactions.

In 2008 the upper two floors of Hallward Library were refurbished. These are the two stockholding subject floors, and provide traditional individual study and research space, enhanced with power and data plug in at certain desks, with pods, printing, copying and scanning on each floor, subject enquiry desks, and a new research reading room, open to all. These floors are for quiet and silent study.

The large investment in RFID technology was made specifically to create self-service as the default method for loans and returns. A new role of Information Assistant was created to offer a higher level of library and IT support, roaming throughout the Learning Hub, for extended hours. Opening on a 24/7 basis was piloted for exams in 2005, and was extended in Hallward Library (the largest) to run for the latter part of the autumn term, the whole of the spring term and until the end of the summer exams, including some vacation weeks prior to exams. A web survey was carried out in December 2007 which showed that the new space was very popular and much appreciated by returning students, who could see the difference. A small number preferred traditional library space to work in and could see no benefit to the new facilities. The Centre for Integrative Learning commissioned an evaluation study late in 2009, using observation of and structured interviews with users.

The furniture bought for level one is not as easily moved as intended, but lessons were learnt from this when buying furniture for level two. Food and drink policy works well on levels one and two but the tighter restrictions on levels three and four have to be actively policed at times. Increased laptop usage does at times strain the wireless and power provision, so these have been improved. The demands made on the lending desk for laptop loan and return have increased work for staff in a way that took the library by surprise. Loan periods and procedures have been changed to help with this.

The Learning Hub and new ways of working are very successful. An already-busy library has shown an increase in use at certain times, and the space is buzzing with activity and used as intended. It is clear that students studying subjects other than those covered by Hallward Library use the space, even though Learning Hubs

were placed in three other libraries at the same time. This is the largest and best equipped space, in the centre of the University Park campus. Laptops are very popular, and a mix of library laptops and students' own laptops in use in the same group is seen. The relaxed food and drink policy on levels 1 and 2 is a success for all. The furniture and fittings are on the whole still in good condition, proving that students will treat a good facility with respect.

Case Study 4: University of Leicester Redevelopment Project

With thanks to Louise Jones of the University of Leicester who provided the information on which this case study is based. The University of Leicester is one of the winners of the 2010 SCONUL Library Design Building Awards.

The library building at Leicester originally opened in 1975. The redevelopment project consisted of a new build extension and the refurbishment of the building. The work on the extension commenced in 2005 and was ready for occupation in April 2007. This was followed by the refurbishment of the old building, with the library fully completed in April 2008. The full cost of the building was £32m, £5m realised through fund-raising, and £4m from SRIF. The remainder was provided by the University. The cost per square metre of the development was £2258. The architects were Birmingham-based Associated Architects who were also responsible for the interior design.

In the mid-1970s the University had 5,000 students, but this had grown to 14,000 on campus so a need for an extension was evident. There was also a need to improve the quality of the space, and to meet the increasing demands for a high quality student experience.

The structure of the building with its concrete floors meant that there were issues around the delivery of flexible IT, a key deliverable for the library. This was addressed through the addition of a raised access floor, the resulting low ceiling heights being accepted as a compromise. The library had been unable to satisfactorily address demand for group and social space provision which had arisen.

Leicester recognised the rapid evolution of academic libraries and wished to be at the forefront of development. It required the new building to be adaptable to handle future changes such as the reorganisation of collections, alterations to the print/electronic balance of collections and the introduction of new services. The library aimed to provide a varied range of high-quality study spaces for undergraduate and postgraduate students, and academic staff, including help facilities and relaxation space. Leicester sought to provide 20 years of expansion space for their printed collections alongside a high level of network connectivity to give good access to electronic collections. Facilities for information skills teaching and seminars allowed library staff to develop user skills for the modern information environment.

The library at Leicester is at the heart of the campus and was one of the first major investments by the University in recent years. The library project was seen as raising the bar for University facilities.

The development has delivered a single seamless space as demanded by the library in its initial planning principles, and has a modern, light, welcoming ambience. User spaces have expanded to 1,500 of all types with pervasive wireless networking. The library now includes the Kirby and West Special Collections Suite for rare books and manuscripts to BS5454 standard, and incorporates additional student facilities such as the Careers Service, Student Learning Centre, AccessAbility Zone and an adjacent but separately accessed 500-seat lecture theatre with associated seminar rooms was also part of the project. Further details of provision can be found on the University of Leicester website.⁹

The development has realised a large increase of provision for fixed IT, almost double the number of workstations that were available in the previous library. To facilitate the use of the wireless provision there is power to the desktop. Desks are bespoke, traditional furniture and not easily moveable. The library has concentrated on modern, classic design for its furniture, with the use of leather for soft furnishing. Art work is also a feature in the building, again with an emphasis on quality. The Group Study rooms are provided with plasma screens, wireless internet access and a PC, and are currently the only provision of this nature on campus. Now these have proved to be a success, more of these are planned elsewhere.

A key feature of the development is the quality of the space which has been delivered; this has been viewed as sending a message about the nature of Leicester as a university. As a part of this the library is definitely viewed as a modern research library, not as a learning centre.

Leicester is not a converged service but within the library the Help Zone is staffed by library and IT staff. Joint training is in place so both sets of staff can answer basic IT and library questions. IT services have closed their external IT help desk. This is seen as answering student requirements and was planned in from the beginning of the project. The library is also looking at virtual help, piloting the use of Meebo and also investigating NorMAN.¹⁰

Self-service was another strategic imperative and this has been well received by the users. Opening hours have been extended to 24/7 during the summer exam period and vacation opening hours have also been extended. Self-service online payments are in place for photocopying and printing, and the library is looking at online payment of fines and room bookings. With stock RFID tagged, self-issue and return and self-pickup of holds are in place. As a result of this emphasis on self-service, staff are redeployed to offer roving help; this includes assistance with the fixed PC equipment.

Some evaluation has taken place. A satisfaction survey on the library environment ran in April/May 2009. This sought to assess satisfaction with the

9 <http://www.le.ac.uk/library/about/building/index.html>.

10 <http://www.norman.net.uk/>.

particular improvements which had been requested by users. All areas were rated 'very good' or 'good'. National Student Survey (NSS) scores for library facilities have increased by 10% to 91%, and scores from postgraduate research students have also improved. Leicester is still tweaking its facilities; for example a silent study zone in the Graduate School Reading Room has been implemented following the initial opening.

The success of the building means that occupancy is very high, which brings its own problems. Areas for further development include the IT training rooms, which are thought to be too traditional in approach. The real successes of the building are considered to be the aesthetics and the quality of the architecture which are viewed as exciting, the new self-service model, group space and the Graduate School Reading Room. Unusually for a development including a refurbishment the building is rated BREEAM¹¹ excellent.

Key Themes

Since 1993 and the Follett report¹², libraries have been changing and evolving to meet the needs of users who teach, learn and research in an increasingly digital environment. Strong themes emerging from the four case studies and from the wider HE environment are:

- flexibility
- collections
- access to technology
- service strategy
- variety in space provision
- furniture.

Flexibility

Currently libraries are juggling competing needs for space within their estate. Space allocation appropriate for 2010 may not be suited to 2020, 2015 or even 2012. In creating spaces we need to be aware of the speed with which developments in technology, pedagogy, economics and publishing may arise, and design in the ability to shift provision to meet the challenges that change may present. This has been specifically mentioned in the case studies. In addition a strong trend is the creation of spaces which can be reconfigured by the end user to fit their particular requirements when they visit the library. Whilst somewhat constrained by power

11 <http://www.breeam.org/>.

12 <http://www.ukoln.ac.uk/services/papers/follett/report>.

delivery, this type of provision is welcomed by users, and will continue to feature in new library developments.

Collections

Various reports predict an increasing move to more born digital materials, and a rapid decline in original print materials. In her presentation at the NPO conference in 2004, Helen Shenton (2004) talked about future collections storage. She featured British Library commissioned research into this area, which predicted an increase of 100% in the annual output of monographs between 2004 and 2020; a 70% increase in the output of UK serials between 2004 and 2020; a 50% increase in serials published solely in e-format by 2016; by 2020, 25% of newspaper being published solely in e-format and that by 2020 40% of UK monographs would be available in e-format only.

However in 2010 librarians are struggling to manage still expanding print collections which are hungry for space. In the HE library community many are moving to a rationalisation of collections, with lesser used materials moving to deeper storage, often away from the main library building. This is allowing librarians to devote more space which, when IT enabled, provides access to both heavier used print materials and an increasing range of e-resources, software and learning environments. The struggle to balance space for collections against other space needs is seen at two case study libraries, Warwick and Edinburgh. Long-term collection strategy is also seen in the rationale for development at Leicester.

To assist this situation various initiatives are underway in the area of collaborative collection storage. The UK Research Reserve (Shorley 2008) is creating a distributed national research collection, between the British Library and the Higher Education sector. This will remove duplicate copies of journal titles, preserving two copies of each journal title within the UKRR membership. Phase 2 of UKRR is seeking to free up 100 km of shelving in member libraries by 2013, releasing space to be used for other purposes. The White Rose consortium (Senior 2007), in addition to their work on collaborative journal storage, has also investigated a similar approach to monograph provision. Perhaps this is an inevitable area for development in the future?

Access to Technology

Following the Follett report, librarians have witnessed the change in the provision of IT and e-resources in their libraries. Our libraries being delivered now show pervasive provision of IT with attempts to ensure that the current set-up will be able to respond to future demands. Wireless access is now standard, with provision of power to the desktop. An increasing range of hardware is readily available to the users, either fixed or through laptop loan. It is inevitable that we will see an

emphasis on technologies supporting the creation of multimedia, rather than just access to it, as new assessment methodologies become available to students. The provision of a wider range of technologies is leading libraries to examine their service strategies.

Service Strategy

Libraries across all sectors have been moving to increased self-service. Routine activities such as the issue and return of stock, and payment of fines, have enabled libraries to look again at their use of staff. Whilst service desks of some description are still evident, they often sit alongside roving help, delivering assistance to users across library buildings at the point of need. These changes have also seen harmonisation of IT and library help, sometimes through the same staff, sometimes with colleagues in IT services. This multi-skilling is likely to increase as the divisions between what constitutes a 'library' and 'IT query' become more blurred. Noticeable too, in the Edinburgh case study, is the inclusion of e-learning help with the service desk provision.

Variety in Space Provision

Each of the case study libraries is providing a wide variety of study spaces for their individual user populations. Each shows a mixture of silent, quiet and collaborative spaces, in open plan or provision of group rooms or pod structures which encourage group interaction. Throughout all these spaces, IT provision, whether through fixed IT or through wireless, is evident. Café provision features in our case studies, as it does in many new developments, providing refreshment and social learning space for the extended opening hours featured in the new buildings.

In each institution, consideration has taken place with regard to the different spaces within the library in the context of space provided elsewhere in the University. In some cases, such as Leicester and Warwick, specific facilities have been deliberately placed in the library. At the same time universities are looking more strategically at space outside the library and developing social learning spaces across their campuses.

Delivering the right kind of space and the right mix of spaces will be increasingly important in maintaining the relevance of the library to the academic experience. The ability to change space around, as mentioned previously, will assist with this. Various libraries which have undergone recent new builds or redevelopments have found the need to re-purpose space arises relatively quickly. The library will need to be constantly in touch with the needs of its different user groups, ensuring the best provision for all.

Furniture

New types of learning space have demanded new and innovative furniture to ensure that they are fit for purpose. There is an increased and necessary emphasis on both quality and robustness. Selection of furniture to cope with the high volume of usage is very important, and exchanging experience with colleagues through personal contacts or sites such as Designing Libraries will be useful.

Furniture is being used to define spaces, which makes necessary changes to space use simple and relatively inexpensive to implement. Also a blend of more traditional with new and experimental types of furniture is evident, the exact mix selected to fit the needs of each individual institution. In most instances power and data delivery to all areas either directly through furniture or through floor sockets or other power delivery mechanisms ensures the blended use of e and print resources in our current hybrid environment.

Evaluation

In this area the JISC funded *Study of Effective Evaluation Models and Practices for Technology Supported Physical Learning Spaces* project (JELS¹³) sought to identify and review the tools, methods and frameworks used to evaluate technology supported or enhanced physical learning spaces. It was intended that the findings of the investigation would contribute to the body of knowledge on the development of learning spaces, any frameworks and guidelines arising from the study informing all stages of development.

The study, which reported in June 2009, is a useful snapshot of the state of evaluation in the UK HE and FE sector. It highlights current frameworks and methodologies used in evaluation, though it concludes that the area is in need of further development. Currently evaluation tends to revolve around justification of expenditure on spaces and the degree to which these are valued by students. Evaluation of the impact of these spaces on learning is less developed, with a few notable exceptions such as the work of:

- the Centre for Inquiry-based Learning in the Arts and Social Sciences (CILASS);
- the Centre for Excellence in Learning and Teaching (CETL);
- the JISC funded JELS project has developed its own framework for the structure and operation of evaluation studies;
- Framework for the Evaluation of Learning Spaces (FELS). This provides: a common vocabulary to standardise evaluations, a checklist of issues to be considered by individual practitioners and evaluators and a structure to describe the nature and character of evaluations completed.

13 <http://www.lsri.nottingham.ac.uk/jels/>.

Various evaluation mechanisms have been used to assess the success of spaces in the case studies, notably user questionnaires and comments. The JELS project shows the way forward to a more mature evaluation framework which the sector will be well advised to draw upon as we seek to demonstrate the full value of learning spaces in the digital age.

Summary

That the library is still at the heart of the academic experience in the digital age is evidenced by the success of our case studies in their institutional environment, and these are only a small number of exciting and innovative redevelopments within the HE sector. The sector is developing its consideration of the continuing need for learning spaces in the digital age, and placing the library firmly as principal deliverers of this space.

In planning our spaces for the future we can utilise frameworks such as the JISC Infokit framework *Planning and Designing Technology – Rich Learning Spaces* which suggest the use of the following for development of a business case (JISC 2009):

- political environment
- economy and its effects
- sociological and societal influences
- technology
- legal (current and impending)
- environmental considerations
- pedagogy
- values of the organisation

Like chameleons responding to their environment, libraries have changed and evolved to ensure that they can support their different user groups in using both print and e-resources, and the accompanying technologies. This response to environmental changes and pressures will ensure the role of libraries at the heart of learning, teaching and research in HE institutions in the future.

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