

Designing Spaces for Effective Learning

A guide to 21st century learning space design

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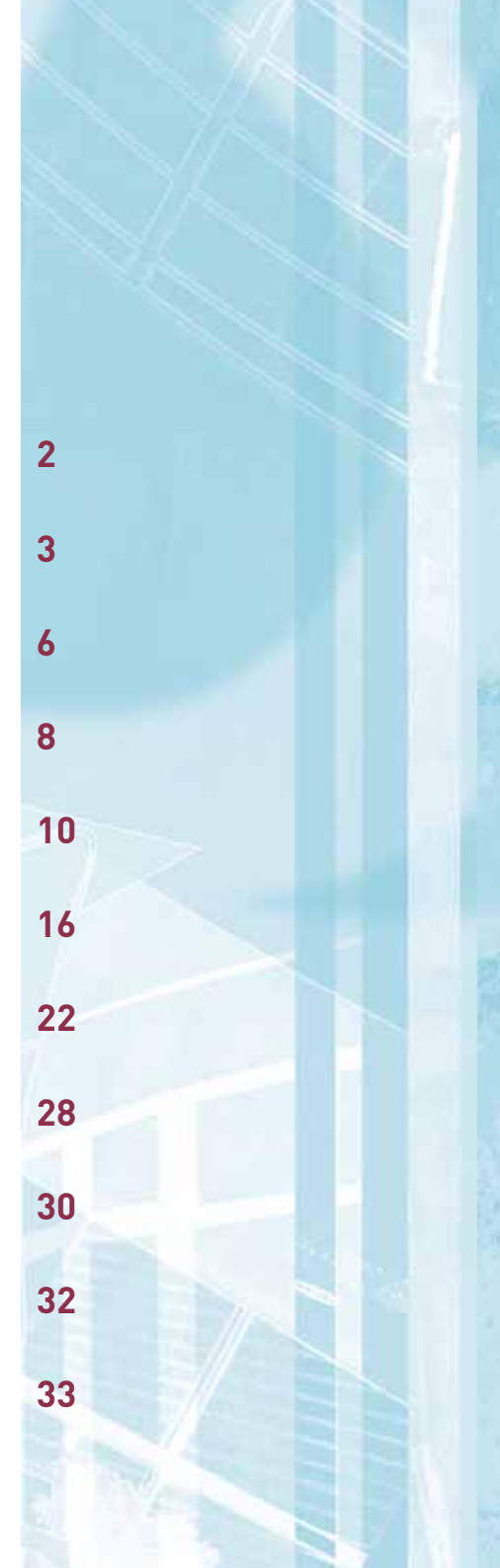
A guide to 21st century learning space design





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Introduction



Learning is changing in the 21st century. Technologies used in learning, such as interactive whiteboards, personal learning environments, wireless networks and mobile devices, plus the internet and high-quality digital learning resources – and the ability to access many of these from home and the workplace – are altering the experiences and aspirations of learners.

Increasing investment in estate and learning technologies, combined with the need for more cost-effective space utilisation, is making it increasingly important for senior managers and decision-makers to keep abreast of new thinking about the design of technology-rich learning spaces.

Understanding what makes an effective design is important. The best are likely to assist all within the institution to work more productively and to produce learners who are confident, adaptable, independent and inspired to learn. In short the design of our learning spaces should become a physical representation of the institution's vision and strategy for learning – responsive, inclusive, and supportive of attainment by all.

Designing 21st century learning

An educational building is an expensive long-term resource. The design of its individual spaces needs to be:

- Flexible – to accommodate both current and evolving pedagogies
- Future-proofed – to enable space to be re-allocated and reconfigured
- Bold – to look beyond tried and tested technologies and pedagogies
- Creative – to energise and inspire learners and tutors
- Supportive – to develop the potential of all learners
- Enterprising – to make each space capable of supporting different purposes

A learning space should be able to motivate learners and promote learning as an activity, support collaborative as well as formal practice, provide a personalised and inclusive environment, and be flexible in the face of changing needs. The part technology plays in achieving these aims is the focus of this guide.





Motivation

Well-designed learning spaces have a motivational effect. Learning areas infused with natural light, for example, provide an environment that is easy and pleasurable to work in. Wireless connectivity within a brightly lit atrium, learning café or open-plan social area will encourage engagement in learning, and instil a desire to continue activities beyond timetabled classes.

Involving learners in aspects of the design is important. This signals that they can have a measure of control over the learning environment and over their own learning. The Stevenage Centre at North Hertfordshire College, for example, has introduced digital local radio transmissions in learning zones within the internet café at the request of students accustomed to working with background sound.

Collaboration

Learners have been shown to benefit academically from social interaction with their peers. Open-plan informal learning areas provide individualised learning environments which also support collaborative activities, and they can often be created from previously underutilised spaces. An example is the internet café. In many institutions, entrance spaces now include open-access IT areas with refreshments and informal seating. Utilisation data have proved the worth of such areas – their value lies in the way they encourage learning through dialogue, problem solving and information sharing in the most supportive of contexts.

Personalisation and inclusion

Barriers surrounding the use of IT are being re-assessed and priority given to enabling, rather than controlling, access to learning. Technology-enabled learning will not be achieved without cost. However, institutions in all parts of the sector are exploring the use of password-enabled wireless local area networks (WLANs), laptop loan schemes and 24/7 access to digital resources in technology-rich learning centres and through virtual learning environments (VLEs).

Another significant trend is to adopt a more customer-focused and permissive approach, backed up by learning space design that encourages self-regulation. Greater maturity among IT users has been promoted by integrating IT into day-to-day activities, installing bookable and open-access computers in previously underutilised locations along circulation routes and in social areas, for example. Learning and information sharing then become seen as an integral part of everyday life.

Flexible furniture and wider doorways meet the needs of a variety of learners, not only wheelchair users. Audiovisual cues and changes in furniture layout can assist learners' navigation around a building, and help them to adjust their behaviour according to the purpose of the space. These represent shifts in attitude that welcome and support all types of learners and promote different ways of learning.

Flexibility

Following two decades of rapid technological change and increasing student numbers, flexibility in the design of learning spaces has become essential. Technologies that are as far as possible mobile and wireless will support a wider variety of pedagogic approaches, and make those spaces more easily re-purposed. But the ultimate in flexibility – large open-plan centres in which both learning and teaching take place – still presents challenges in management of sound, heat and student activity, and a mix of formal and informal learning spaces is still more frequently chosen.

“Organisations all face pressure to deliver higher standards of education, to greater numbers of students, with tight financial restrictions, but still need to provide facilities that will attract students in a competitive market.”

JISC eSpaces Study, University of Birmingham (2005)

The Learning Café

The Learning Café at Glasgow Caledonian University was an early experiment in the use of space to support problem-based learning and group work. The café opened four years ago, and its success as a learning space is clear from student evaluations.

The deliberate mix of refreshments, social activities and IT makes this a relaxing and friendly place where conversation and social interaction are seen as an essential part of learning. Sixty open-access flat-screen terminals stand back to back for group study in the centre of the café, and on bars around the edges for individual study, while laptops on a number of low-level coffee tables encourage informal discussion alongside access to IT.

A welcome page on the café website encourages users to explore their learning preferences and time-management skills over a cup of coffee, and links to mind-mapping software introduce an essential tool for learning support. Thin-client technology keeps background noise and heat from computer drives to a minimum.

Learning cafés are now running successfully in many institutions, proving fears over IT-based informal learning environments unfounded. The Learning Café at Glasgow Caledonian has also proved financially successful as profits are ploughed back to cover the maintenance costs.



Transforming learning experiences

Embedding technology into learning and teaching spaces is likely to be an evolutionary process rather than a revolutionary one.

Considering technological requirements at the early stages of planning will ensure that maximum benefit can be obtained from the investment.

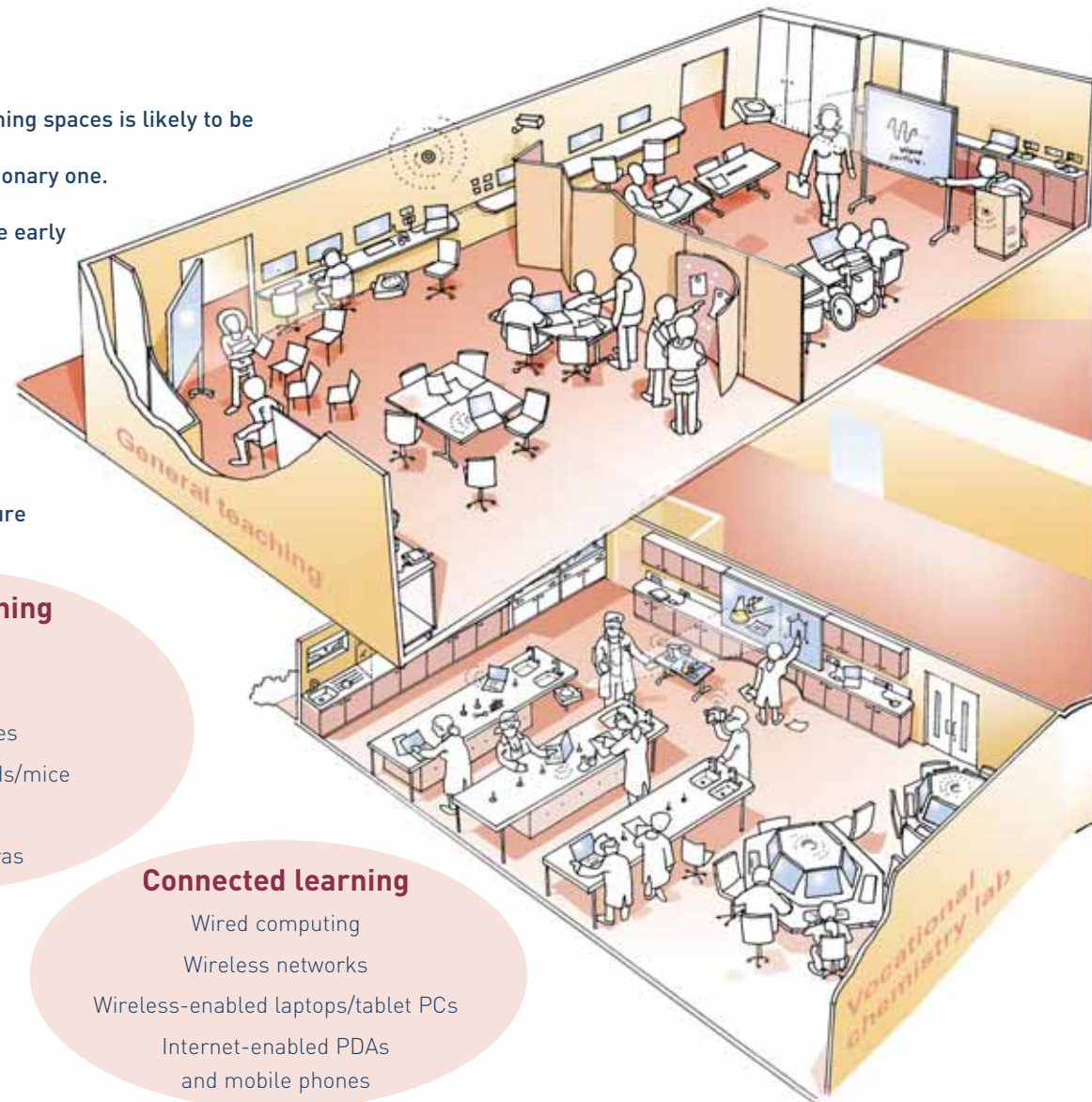
Start by establishing your pedagogic aims, then review the design and the technological infrastructure in the whole institution, to ensure that your aims can be achieved.

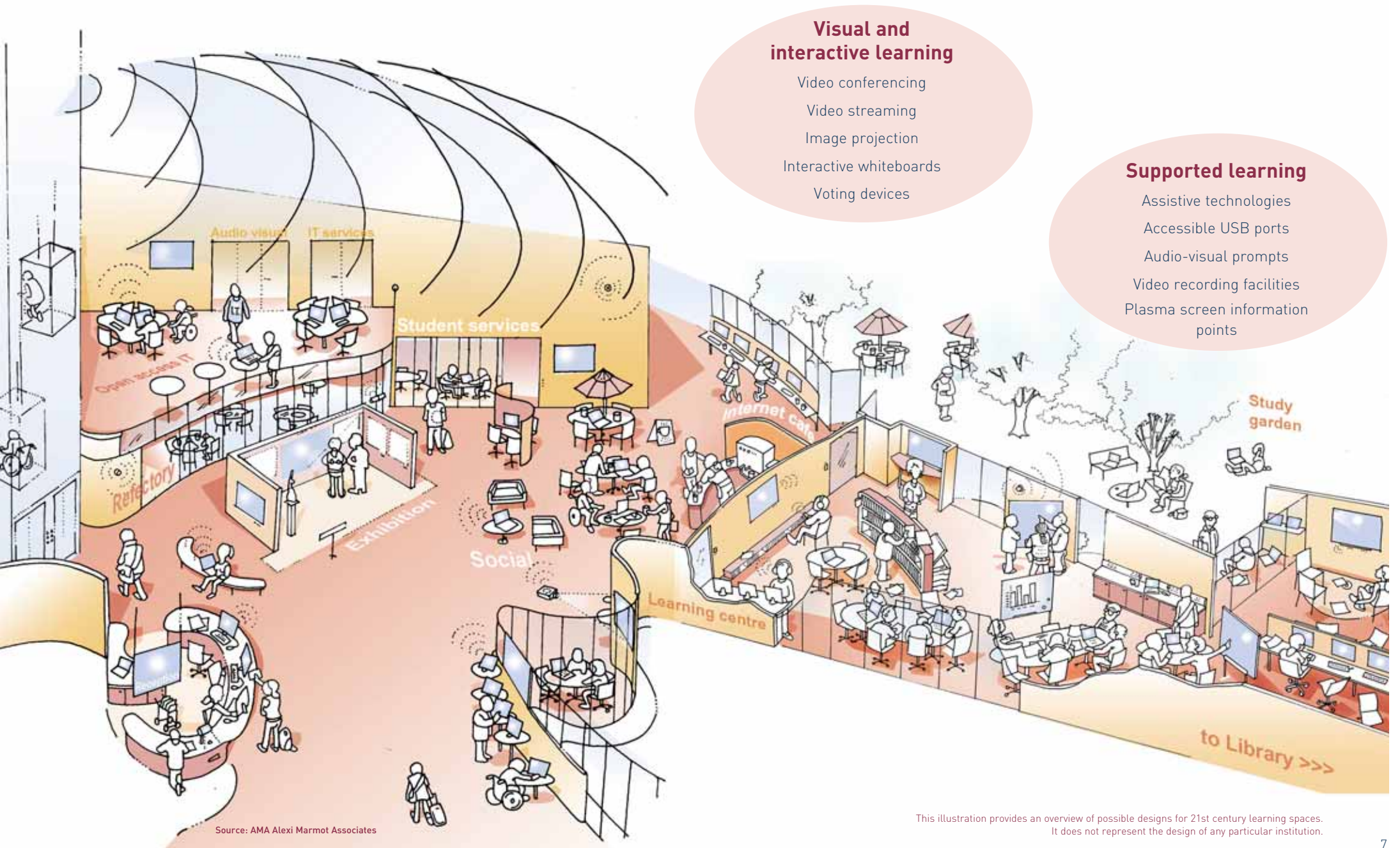
Mobile learning

- Tablet PCs
- Laptops
- Mobile phones
- Wireless keyboards/mice
- PDA's
- Digital cameras

Connected learning

- Wired computing
- Wireless networks
- Wireless-enabled laptops/tablet PCs
- Internet-enabled PDA's and mobile phones





Visual and interactive learning

- Video conferencing
- Video streaming
- Image projection
- Interactive whiteboards
- Voting devices


Supported learning

- Assistive technologies
- Accessible USB ports
- Audio-visual prompts
- Video recording facilities
- Plasma screen information points

Source: AMA Alexi Marmot Associates

This illustration provides an overview of possible designs for 21st century learning spaces. It does not represent the design of any particular institution.

Entrances



Entering a college or university building should create a sense of excitement about learning. The entrance is the first point of contact between the institution and its clients and will establish the prevailing culture for visitors. Its next priority is to offer clear, accessible information about the institution and what can be achieved there. An entrance area will also need to provide a welcoming, secure environment, establishing the capability of the institution to cater for its learners – after all, it has to compete for learners’ time and attention with the shopping mall, the leisure centre, and facilities and technologies within the home.

Reception

The entrance to a college or university building has, in effect, an important and multifunctional role, yet so often is little more than an uninspiring space containing a reception desk managed by overstretched and isolated frontline staff.

Imagine something different...

Touch-panel information screens close to the entrance provide institutional and course information for potential students, and floor plans and promotional video displays for visitors. Audio versions are also available. A wireless-enabled interview area to one side offers potential learners more in-depth analysis of their needs, with trained enrolment staff accessing course information from tablet PCs.

Learners arriving at the start of the day pick up the day’s timetable and room changes from plasma screens in a prominent position near the entrance to the learning cafe. They may also have received notification of changes via text messages to their mobiles. One large plasma screen overlooking the entrance reminds learners of key events in the institution’s calendar or activities for the day. These multiple routes to information ensure a variety of needs are met.

Security is attended to – CCTV cameras are in evidence and card access into the building may be required in some instances – but a proactive service-delivery culture ensures that reception staff respond helpfully to the needs of visitors, assisted by a range of information outlets. The ambiance is calm and authoritative. Brightly lit, spacious and architecturally impressive, the entrance area inspires interest and respect.

Services

Learners passing through this space can access services such as counselling, careers, academic or financial advice, or even shop for essentials, as they enter or leave the building. Wireless connectivity and varied arrangements of furniture provide flexible interview areas. Zoned use of audio outputs means that local digital radio or music can be heard in some parts of the entrance and reception, providing travel information and a calming effect on those passing through.

Multi-purpose

A wider entrance area or atrium can provide space for displays of learners' achievements in a variety of media, including broadcast media. Its public nature and architectural and acoustic features provide an ideal backdrop to events relating to performing arts, music, media studies and fine art courses in the institution, and a forum for celebrations in the annual calendar – open days, awards ceremonies and end of term events – particularly if a larger conference or lecture hall opens out behind it.

The role of the entrance is vital. If it is little more than an imposing portal to the institution, or a spacious circulation route through to other parts of the institution, then opportunities have been lost. It can form the heart of the institution, and establish a culture of learning, support and professionalism, which reflects the institution's vision. It can bring together in one space the range of facilities on which learners depend, and demonstrate effective use of up-to-date communication and information technologies.

The Stevenage Centre, North Hertfordshire College

This state-of-the-art building completed in 2003 has a strong learner focus. Within the curve of a wave-shaped external frontage, the entrance, known as the Atrium, contains an internet café, a display area for students' work, a central reception area and meeting booths for careers advice and guidance. A relatively small-scale wireless network supports use of mobile computing equipment for staff and learners. The design promotes access for all, and is highly flexible – based around a central core, it can be altered to support different kinds of activity.

Promoting a culture of respect and independence has been key to the management of this space. Password-enabled access to gaming is being trialled at lunchtimes and in twilight hours, as is the zoned use of background music. The presence of computers so close to the entrance is justified by the powerful statement this makes about the pervasiveness of learning. Management is security conscious, but aims to prevent this becoming a barrier to learning.

The mix of learners and staff working within the Atrium establishes it as a purposeful meeting place, designed to encourage and support learning.

“I believe passionately that when you walk through the door of a place of learning, you should feel proud, uplifted, motivated. ...That should be our intent.”

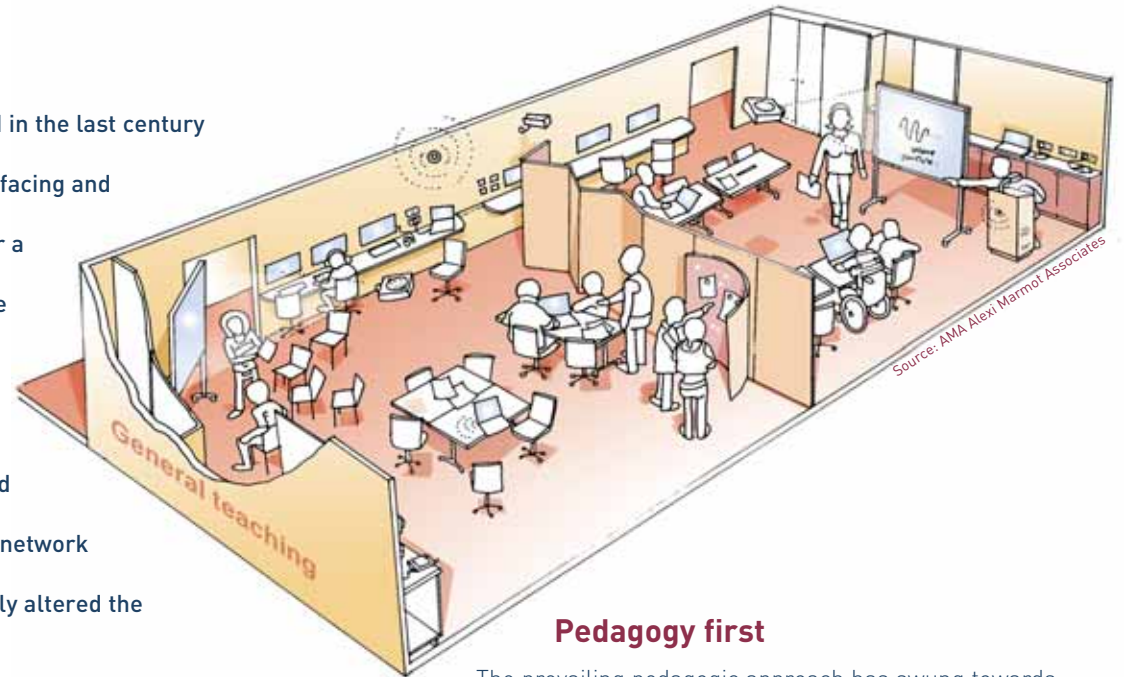
Mark Haysom, Chief Executive of the Learning and Skills Council (LSC)



Teaching spaces



General teaching spaces have been dominated in the last century by one type of design: tutor-focused, one-way facing and presentational, with seating arranged in either a U shape or in straight rows. Technologies have subsequently been added – interactive or conventional whiteboards mounted on the wall behind the main speaker, ceiling-mounted projectors with cabling to a laptop, a wireless network and/or wired computers – but these have rarely altered the dynamics of the design.



Pedagogy first

The prevailing pedagogic approach has swung towards active and collaborative learning, but room design and staff skills sets do not always reflect this.

To resolve what is the best way forward for the institution, effective dialogues are needed to establish what will be required from the spaces, what changes in pedagogic approach are desirable, and why. Investment in developing the skills of staff also needs to be matched by fostering their ownership of the proposed changes. Visits by staff to other institutions have proved beneficial in supporting change.

The design of most general teaching spaces will usually need to support both tutor-led and learner-led activities. These will include presentations, discussion, collaborative project work, and information

retrieval and sharing. These needs have been met in different ways, with separate rooms being allocated to different purposes in some models and, at the other end of the spectrum, teaching taking place in open-plan flexible learning centres. What is essential, whatever the choices made, is that the adopted design is influenced more by clearly defined pedagogic goals, articulated by both managers and staff, rather than by other considerations, such as a desire for innovation or efficiency gains.

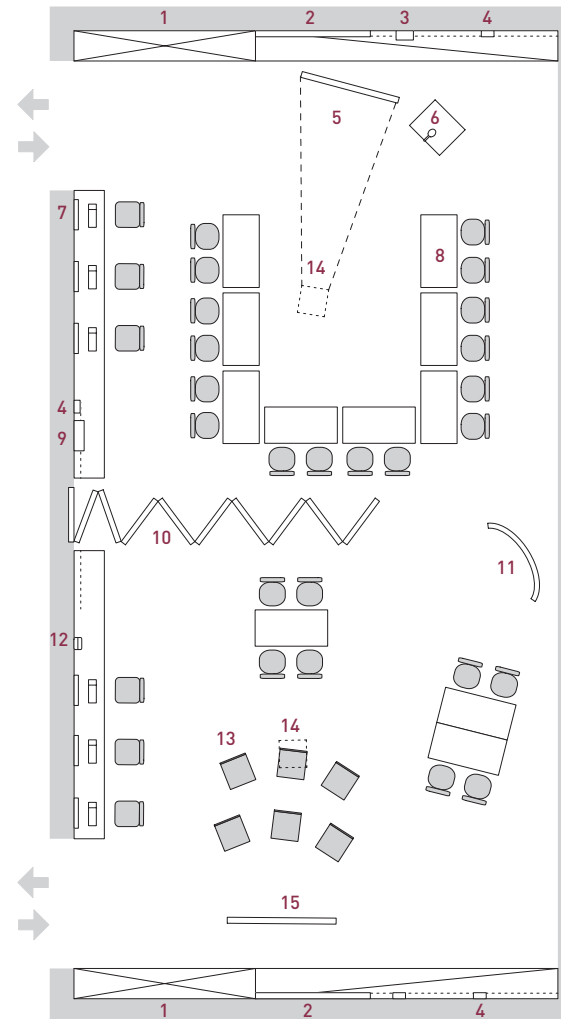
Future-proofing

We cannot anticipate future technological or pedagogic developments, but can ensure that designs will accommodate change. Investment in higher specification mobile rather than fixed technologies, wireless as well as wired networks, even bespoke furniture, may be justified when the space can support a range of purposes, and be relatively easily reconfigured. It is also probable that institutions will aim increasingly for fewer but better quality teaching spaces, with increased space per seat: large group or dispersed group teaching is already being supported by video streaming and video conferencing. Cameras in teaching spaces can offer that flexibility.

Tools fit for purpose

Use of technology in itself does not ensure effective teaching or learning, but it can extend the reach and flexibility of what the institution offers. Display technologies are now widely available in teaching spaces. The next significant development may come from audiovisual technologies. Wireless networks also provide significant advantages. 21st century institutions need to assess rapidly and accurately how effective courses are. Giving tutors wireless-enabled tablet PCs for e-registration can ensure attendance data is fed immediately into central records, provide the tutor on the move with a tool for preparation, and give both learners and tutors access to resources during the session – from any part of the space.

General teaching spaces



Raised floor and ample perimeter cabling for easy access to power and data points.

- 1 Lockable storage and recharging facility for wireless tablet PCs
- 2 Whiteboard
- 3 Receiver for voting devices
- 4 Power sockets
- 5 Mobile interactive whiteboard
- 6 Lectern with control panel for lighting and power/network points
- 7 Wired computers
- 8 Foldaway tables
- 9 Charger for voting devices
- 10 Folding/sliding acoustic wall
- 11 Free-standing magnetic surface/partition
- 12 Wireless hub
- 13 Stackable chairs
- 14 Ceiling-mounted projection
- 15 Video conferencing facility

This floor plan gives prototype designs for two teaching spaces. It does not represent designs in any particular institution.
Source: AMA Alexi Marmot Associates

University of Strathclyde

The InterActive Classroom

Changes in teaching style in the Department of Mechanical Engineering at the University of Strathclyde in the 1990s were prompted by low achievement and attendance among first year students. The department turned to a version of the Socratic dialogue model, or teaching by questioning, developed at Harvard University, in a bid to re-engage its students. The standard combination of tutorials, lectures and workshops was replaced by a series of two-hour active learning sessions, involving mini-lectures, videos, demonstrations and problem solving. Questioning and discussion replaced knowledge transfer as the main model of delivery, and a custom-built lecture theatre – the InterActive Classroom – was created from existing teaching accommodation in the James Weir Building to support this approach. An electronic voting system was introduced to help students test their understanding of concepts in response to multiple choice questions, and collaborative discussion before and after voting became established as an integral pedagogic approach.

The Teaching Cluster

In 2000, the first Teaching Cluster at Strathclyde evolved out of the success of the initiative. This is a centrally managed suite of teaching rooms that includes an interactive classroom, seminar rooms and a

teaching studio, providing a mix of peer instruction, problem-based learning and studio teaching. To gain maximum benefit from collaborative discussion, curved desks have been added in some rooms, introducing increased interactivity into a traditional teaching space.

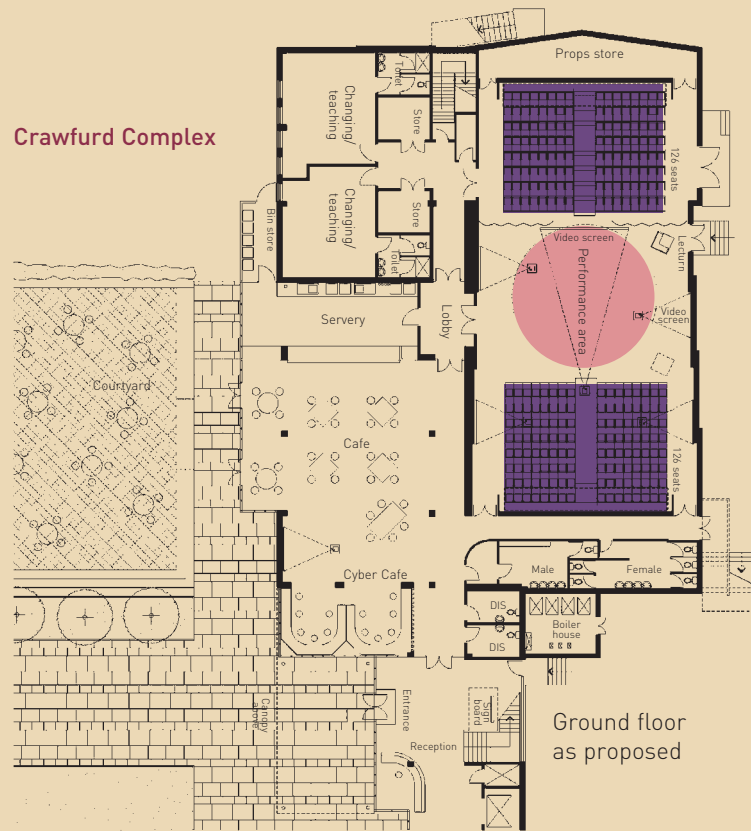
The cluster concept is being introduced in other areas of the university as part of a phased development to group together spaces used by faculties, and to provide more flexible updated teaching accommodation. Plans are under way to provide social spaces adjacent to some. The Teaching Cluster developed out of a need for pedagogic change, but is encouraging the university to rethink its allocation of teaching spaces on a wider scale.

An example of a Teaching Cluster is the Crawford Complex. Mobile stackable seating enables conferences, cinema screenings, theatrical performances and innovative teaching sessions to take place in one larger space linked to two or three smaller ones by video and audio links, which supports both small and large scale activities. However, for more expensively equipped spaces such as the £1.8 million Crawford Complex to be used to capacity, they must be centrally managed and bookable.

'Active, collaborative learning', a JISC video case study illustrating the changes introduced in the Department of Mechanical Engineering, can be viewed at www.elearning.ac.uk/innoprac/practitioner/strathclyde.html



Crawfurd Complex



Source: University of Strathclyde

Planning and management of spaces

An institution planning such changes will gain from establishing a space management team, which brings together expertise from across the institution. This team will be chaired by a senior manager to ensure effective decision making, and will have representation from estates, IT services, library and student services, teaching and learning development staff, academic staff, and learners themselves. However, independence from established interests within the institution should be maintained.

The team will focus its efforts on assessing the type and quality of estate in different faculties or parts of the institution, to facilitate improvements in space utilisation and oversee the upgrading of accommodation. The availability of technologies within those spaces should form part of regular accommodation audits, but can also help in showing how spaces are used – webcams to record the extent to which rooms are occupied can offer cost savings in the long run. Centralised online booking systems are also gaining ground in both further and higher education as a means of increasing effectiveness in managing space utilisation.

Institutional structures for the planning and management of spaces will vary, but must involve IT teams to ensure that new designs are both technology-rich and feasible. To ensure that learning technologies are effectively embedded into the design of innovative learning and teaching spaces, it is recommended that a senior member of the IT team is involved at the highest level of decision making.





Looking to the future

If we are to foster truly flexible, creative and adaptable minds, we need to look more critically at the extent to which learning space designs promote innovative ways of thinking. This has been the aim of the joint Centre of Excellence in Teaching and Learning (CETL) initiative between the University of Sussex and Brighton University, which has developed an experimental new teaching and learning space, the Creativity Zone, drawing on a blend of expertise in engineering, cognitive science, pedagogy and design from both universities.

Although relatively small in size (a total of approximately 300 sq. m.), the Creativity Zone could revolutionise teaching and learning by blurring the boundaries between disciplines, between formal and informal learning, and between learning and creative practice. Essentially two spaces joined together in an L shape, it can be partitioned and reconfigured in many ways to meet a breadth of educational and performance requirements. Ingenious partitions, screens and items of furniture are fitted into the fabric of the space. Multiple projectors, wireless connectivity and location-aware technology mean that the experience generated in any part of the space can be varied to offer a progression of opportunities for thought and interaction, both with objects and other participants. A flexible infrastructure supports each activity and stage in the voyage of discovery.

In this space practitioners act like set designers – supported by learning technologists and facilitators, they can simulate real-world practices in microcosm by deploying light, sound and objects to create an immersive, cross-disciplinary experience. Sessions in the Zone will support learners in working towards new understandings, for example bringing individuals from different disciplines together in one collaborative exercise.

A database of activities and 'learning journeys' will be generated from its use, to widen our understanding of how physical space design can impact on learning outcomes.

The Creativity Zone combines a range of innovative features, any one of which could be the prototype for taking forward our understanding of what constitutes learning and teaching for the 21st century. While not all of these will be present in every future teaching space, promoting creative ways of thinking will almost certainly have higher priority.



Source: University of Sussex

The Robinson Rooms, London School of Economics and Political Science (LSE)

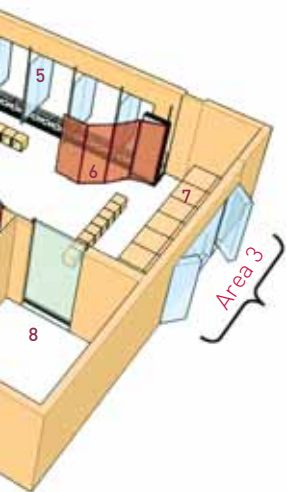
The Robinson Rooms illustrate how an experimental teaching space has been created within the constraints of an existing structure. In 2004, redundant catering facilities were redesigned to provide three interconnecting rooms, the largest seating up to 50, and an audiovisual control centre. This space was to have two aims: to support innovative approaches to teaching and learning in the institution, and to provide a bookable conference and accelerated solutions environment for external clients. At a cost of £60,000, more than half of which was spent on technology and furniture, the refurbishment has been a cost-effective way of setting up a test-bed for design of teaching spaces throughout the institution.

A comprehensive range of technologies was built in to the three rooms: video streaming, audio zoning, mobile interactive whiteboards with projection facilities, video conferencing, wireless networking, tablet PC banks, magnetic work walls, a personal response system, voting devices and recording facilities. Every item in the space is on wheels, from the interactive whiteboard to the tables – this means the rooms can be quickly emptied and reconfigured. Activities can then be captured on video and uploaded to a website or the VLE for further analysis.

This is an environment for collaborative and explorative learning. It can be booked for special events, such as whole-day workshops, when graphic artists and technical support teams can be called in to capture a record of the outcomes. At other times, it is used routinely for classes.



- 1 Small pod with plasma screen for individual reflection
- 2 Spaces for wall-mounted touch-screens
- 3 Array of sliding screens with various surfaces
- 4 Mobile storage/seating cubes
- 5 Revolving windows with white 'blackout' screens
- 6 Fold out 'concertina' screens for display, projection and partition
- 7 Raised stage area formed of larger cube storage units
- 8 Control room
- 9 Storage area
- 10 Fold-down tables
- 11 Two independently revolving walls with display boards, interactive touch-screen and fold-down work surfaces
- 12 Revolving display board wall
- 13 Refreshment point
- 14 Revolving screens with interactive touch-screen and display boards



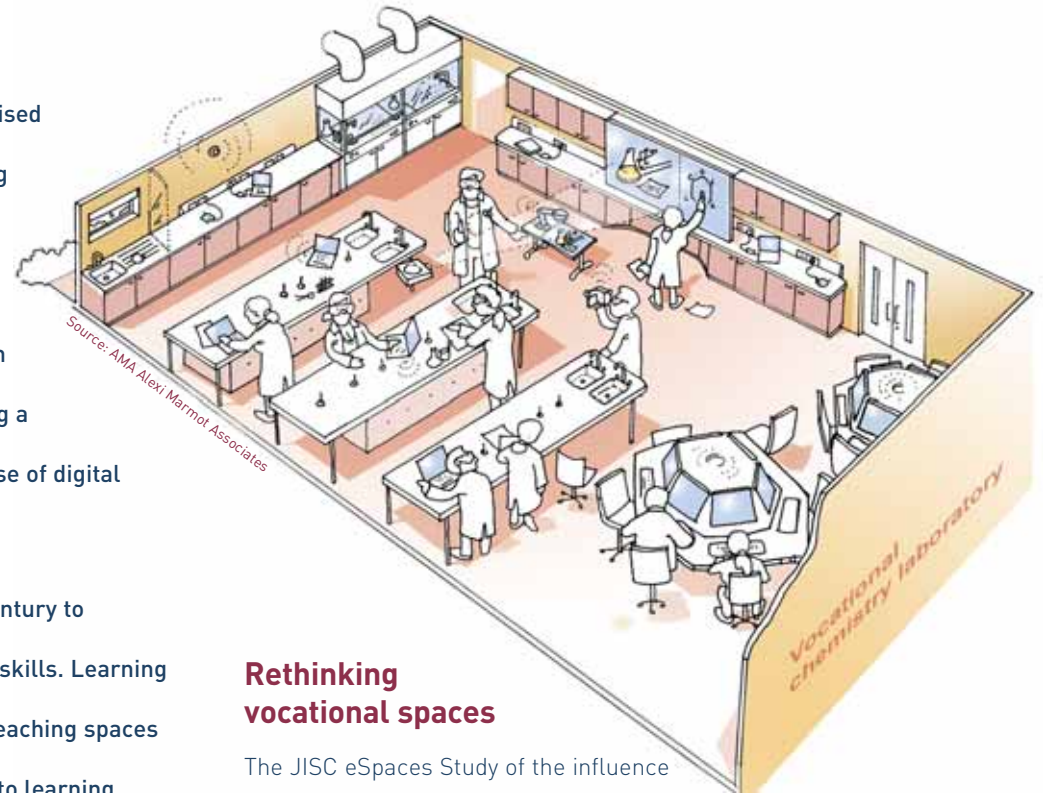
“The creation of innovative learning spaces is a journey. We have created a space in which we are still finding out more about teaching and learning.”

Garrick Jones, Fellow of the Institute of Social Psychology, London School of Economics and Political Science (LSE)

Vocational teaching spaces

Vocational spaces are diverse, and have highly specialised requirements for equipment, room size and supporting infrastructure. As a result, the use of learning technologies within these environments has not always been given priority. Vocational areas have often lagged behind other parts of the institution in providing a technology-rich learning experience, apart from the use of digital equipment in particular activities.

However, a higher priority is being given in the 21st century to developing learners' creativity, adaptability and wider skills. Learning technologies embedded into the design of vocational teaching spaces can make a difference by providing immediate access to learning resources, diversifying routes to understanding, and supporting opportunities for on-the-spot recording and assessment of skills.



Rethinking vocational spaces

The JISC eSpaces Study of the influence of technology on learning space design by Birmingham University identifies two key drivers – pedagogic and operational. Operational drivers may have particular relevance for vocational areas – the need to refurbish ageing or scattered estate, and the impact of changes in the economy and in demand for types of courses have frequently prompted institutions to reassess their provision.

Pedagogic drivers matter too. Laboratory or workshop-based learning and outreach classes can all too often be a narrowly-focused experience which takes place in outdated environments at a distance from the main campus. But this need not be the case.

Implementing a wireless local area network (WLAN) can revolutionise approaches to teaching on vocational courses. If a WLAN can be set up in vocational teaching spaces (local conditions allowing), access to web-based learning resources from mobile devices can give vocational learners more immediate opportunities to reinforce their understanding 'on the fly'. Adding a presentation area with a screen and projector to a workshop environment will also help to enhance learning. Vocational learners need to develop e-portfolios and update learning diaries, and an environment with prompt access to IT will support these essential activities.

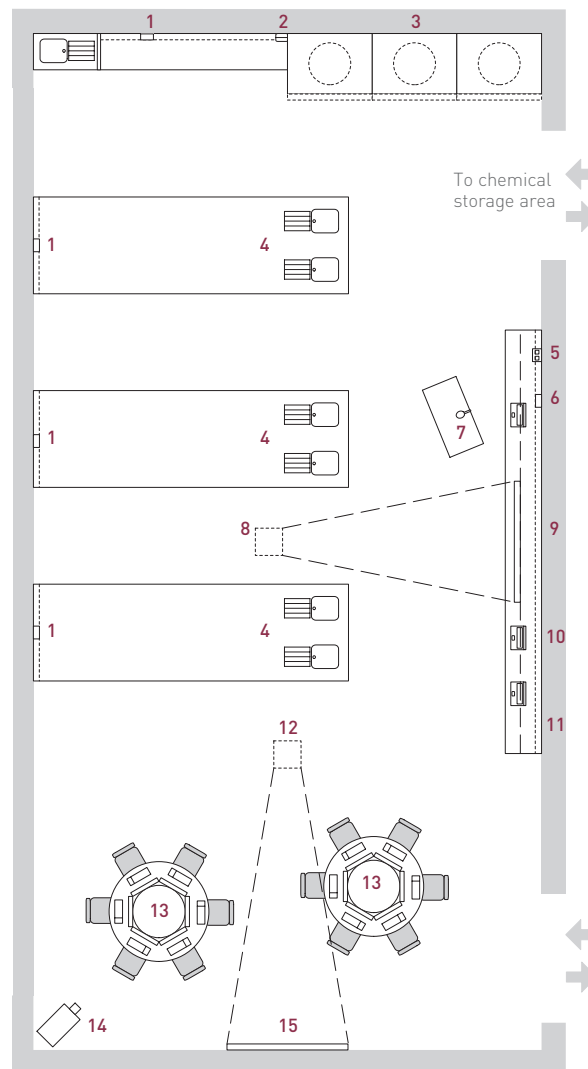
On the other hand, refurbishment of existing spaces may not always be feasible. Inflexible room sizes, costly repairs to external structures, the presence of hazards such as asbestos, and mounting costs of maintaining scattered estate are some powerful reasons for starting afresh.

Integrated technologies

It is likely that audiovisual media will play an increasing role in 21st century learning and teaching. Cameras can capture demonstrations by experts for later replaying, and can also record the level of the learner's achievement for e-assessment. In many simulation environments, video cameras are also a teaching aid, used to record performances in tasks, so that techniques and skills can be improved.

The floor plan featured here is for a prototype laboratory which brings technology, including cameras, into the most challenging environment – the wet chemistry laboratory. The room layout promotes group as well as individual work, supported by laptops at the workbenches. A wall-mounted camera records key demonstrations, which can be uploaded to the VLE for distribution to learners working remotely, or for revision purposes, while multiple projectors enable tutors to project examples onto display screens above the benches. Durable and low-cost mobile devices such as laptops and PDAs encourage learners to access resources on the institution's network and the internet, and write up their observations as they progress.

Vocational spaces – chemistry laboratory



- 1 Power sockets
- 2 Wireless hub
- 3 Fume cupboards 1 per bench
- 4 Lab benches with services and sinks
- 5 Equipment charger
- 6 Power sockets for recharging laptops and PDAs
- 7 Mobile unit with wireless visualiser
- 8 Ceiling-mounted main projector
- 9 Wall-mounted whiteboard and main projection screen
- 10 Wired laptops
- 11 Bench with storage above and below
- 12 Ceiling-mounted projection or multi-directional central projector
- 13 Free-standing units with high-level monitors, power sockets and data points
- 14 Wall-mounted digital video camera for distributed learning
- 15 Wall-mounted interactive whiteboard and additional projection screen

This floor plan gives a prototype design for a chemistry laboratory. It does not represent a design in any particular institution.
Source: AMA Alexi Marmot Associates

Raised floor and ample perimeter cabling for easy access to power and data.

Stephenson College, Coalville

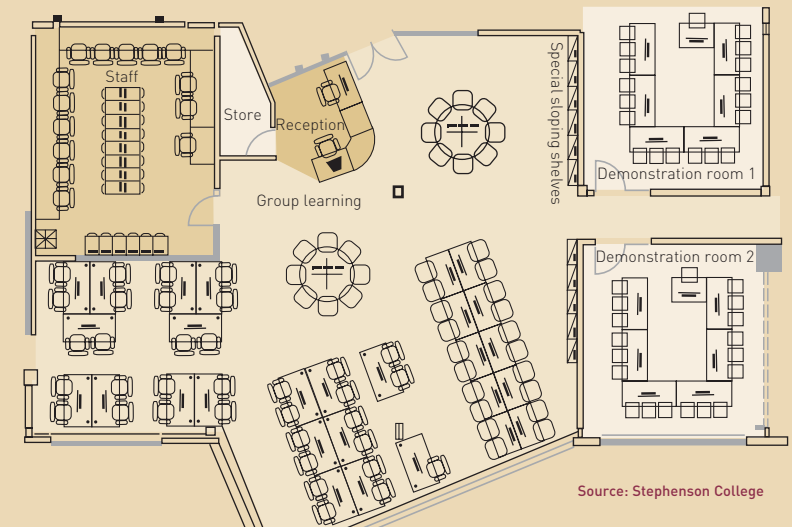
Stephenson College moved in 2005 to a new £15.5 million building on a brownfield site on the outskirts of Coalville in north west Leicestershire. Focusing solely on vocational courses, Stephenson College has been awarded Centre of Vocational Excellence (CoVE) status in motor vehicle maintenance and construction in conjunction with Leicester College.

At the centre of the new build is 'the Street', a wide naturally lit concourse running the length of the building, with curricular workshops and learning clusters situated opposite each other.

Each cluster is a compact unit made up of related rooms and services which brings all learners in that curriculum area – regardless of level – into one close-knit community.

The main space in each cluster is an open-plan learning centre with an enquiry desk and administrative support. Tables are arranged in different configurations inviting individual and group work, with or without computers. The learning centres also contain a library of essential course textbooks, so that learners have flexible access to different modes of learning. A staff working area overlooks the learning centre, and on the opposite side of the cluster are four demonstration rooms. Each of these rooms accommodates 20 learners and is equipped with an interactive whiteboard and a wired computer for electronic register-taking. Partition walls have been built into some clusters to allow for future expansion.

The college is entirely wireless enabled, so staff and learners can access the internet and the college's own networked resources from mobile devices in workshops and social areas, or in the learning clusters. The proximity of staff and learners in the clusters establishes a strong sense of group morale. Staff and students also use a common social area and bistro at one end of the Street and can work in the same open learning areas in the clusters. Not all staff enjoyed this proximity initially, but it is considered to have a beneficial effect on student achievement and reduces the need for additional staff to monitor one larger learning centre set apart from the teaching accommodation.





The Interactive Kitchen, Lewisham College

Audiovisual technologies are likely to be more innovatively and creatively used in 21st century learning. The Centre of Vocational Excellence in hospitality and catering at Lewisham College in south east London is an example of the impact video can have in vocational teaching.

In the college's interactive catering theatre, classes can be filmed by digital cameras controlled by the learners themselves, so that they can view in detail on flat screen monitors on their desks the techniques and skills being demonstrated.

The demonstration is also recorded on a computer and can be broadcast live over the web to a much wider audience. Aspects of the demonstration may be turned into a digital learning 'package' after the session – this can comprise stills images, edited video footage, quizzes and audio commentary. The flexibility of these digital resources benefits learners, who can replay video clips for revision, pausing where need be to reinforce their learning. Issued as a CD-ROM or DVD, or uploaded to a web page, they provide a resource learners can turn to again and again.

Both capture and playback of the activities can take place seamlessly within the sessions in the Interactive Kitchen because cameras are built in to the structure of the training room.





University of Strathclyde

Department of Design, Manufacture and Engineering Management

The Department of Design, Manufacture and Engineering Management teaches product realisation from design through to manufacture and occupies teaching spaces and laboratories in the James Weir Building.

The refurbishment of one of these rooms during 2006 will bring into one space various stages in the design and manufacture process, which have previously been located in different parts of the university. This will simulate a real life working environment, and support problem-solving and scenario-based learning.

Various technologies are integrated into design and manufacture in industry, and this process is replicated in the zones of activity within the new design. The process of design starts with discussion of initial concepts, and moves to the computer-aided design (CAD) suite in the centre of the room, where ideas can be visualised on screen using

CAD software. Computer workstations adjacent to the data-capture area provide access to networked resources. When an idea is sufficiently advanced, a presentation area gives students the opportunity for peer group review of their work. The realisation of the design takes place in the rapid prototyping room – a separate room but with a transparent partition to provide sound insulation but still allow activities there to be integrated into other stages of the process.

The design gives the most space to the CAD suite where single wall-facing workstations may be used for individual work, and multiple workstations support paired and group work. However, the importance given to communication and presentation skills is also evident in the audiovisual presentation area.

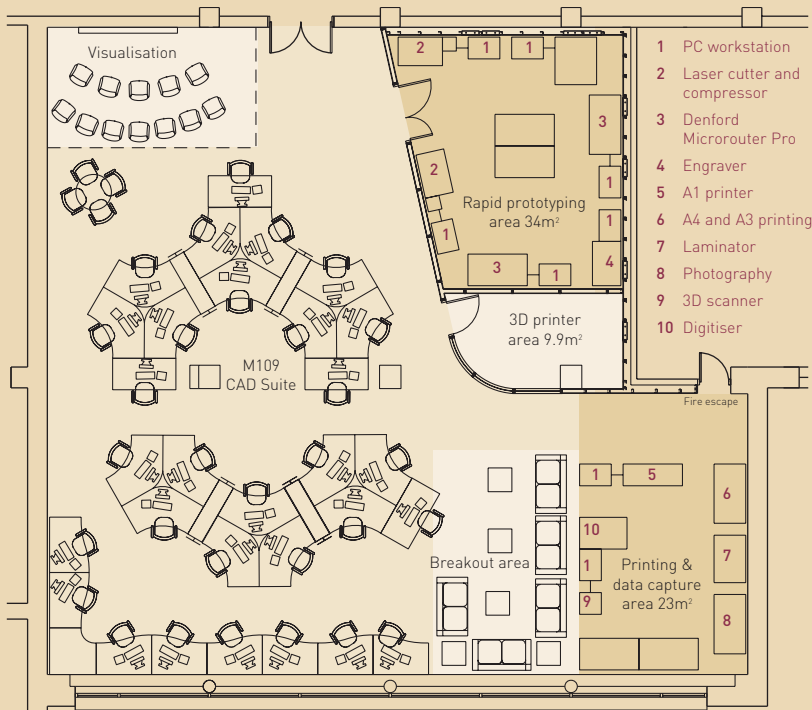
The regrouping of a range of facilities into this one space and the updating of equipment is part of the university's aim to review space allocation and improve student achievement. The vision for the floor as a whole is to develop other adjacent spaces so that the whole process from product design to manufacture can be supported in a cluster of related spaces.



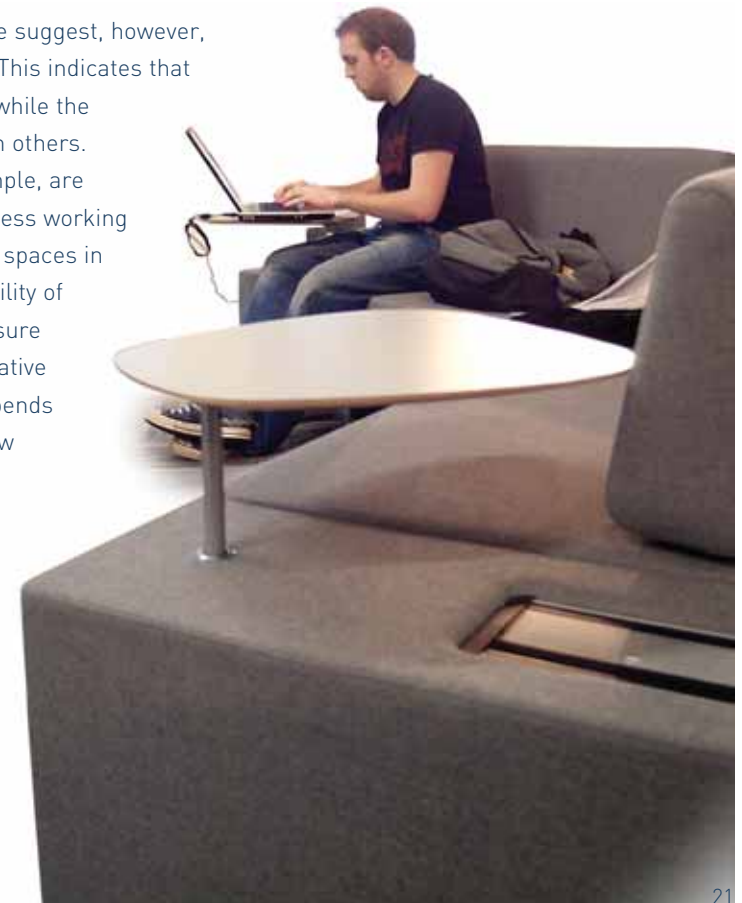
Space utilisation

The AMA Alexi Marmot Associates report to the Scottish Funding Council (SFC) 'Spaces for Learning' (2006) suggests that upgrading accommodation to effectively support personalised models of learning in technology-rich spaces could significantly increase the amount of space per seat. While distributed learning can alleviate the pressure on accommodation in some areas, other developments, such as computers in teaching spaces, increasing use of collaborative group work in assessment, and new requirements such as immersive or simulated learning environments in higher education, could mean that learning providers seek to augment rather than rationalise their estate.

HEFCE data on seating density and usage of space suggest, however, that the sector is becoming more space efficient. This indicates that savings on space are being made in some areas, while the amount of space needed per seat has increased in others. Social areas which are wireless enabled, for example, are increasingly popular among students as open-access working environments, and may reduce the need for study spaces in library and learning centres. Similarly, the availability of digital resources on a 24/7 basis can reduce pressure on teaching accommodation, by offering an alternative gateway to learning. Efficient space utilisation depends on regular space audits and an appreciation of new priorities, so that underused areas can yield advantages elsewhere.

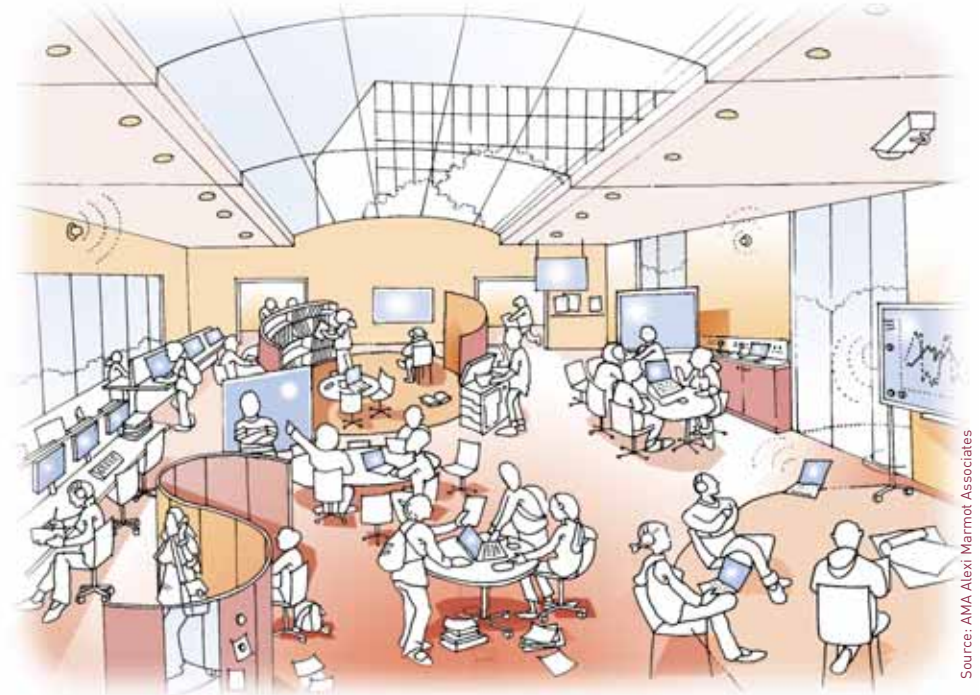


Source: DMEM University of Strathclyde



Learning centres

The concept of the learning centre is still evolving, usually blending with other previously distinct spaces to absorb more of their functions. Rethinking the learning centre has led to substantial new-build projects in universities especially, where this space is envisaged as the social and academic hub of the campus. However, smaller scale learning centres are also appearing – connected to teaching accommodation to form curricular clusters, for example, or as a separate high-tech, highly personalised learning environment in addition to the library.



Source: AMA Alexi Marmot Associates

Form and purpose

We now expect that learning will involve many different activities, each having different behaviours associated with it. This can make the learning centre the most multifunctional of spaces. A large central learning centre in a university, for example, provides social spaces, student services and study support, book and laptop loan, access to IT, and different kinds of working environments, from comfortable seating for collaborative group work, to 'board rooms' for practice presentations. Some elements of teaching may also take place within a learning centre environment.

These varied purposes demand a clear vision for each area within the centre. Zones, or different floors for different modes of learning, are

common management strategies. Where a space is required to support a range of purposes simultaneously, users may lack a sense of appropriate behaviour and activities may conflict with one another. The direction the space should offer them is lost.

The self-regulating building

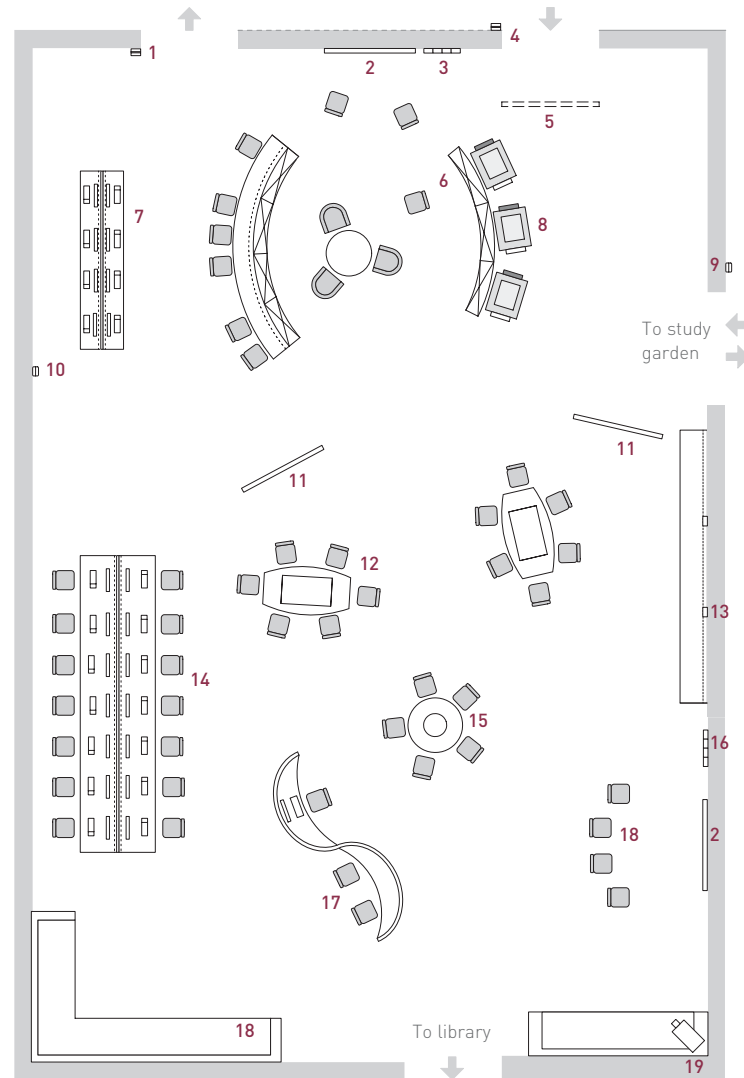
The case studies in this section show a more sophisticated understanding of space management, where sound and visual cues, layout and style of furniture, and different types of technology in different configurations, signal the different purposes of areas in the centres. Such designs illustrate an ethos of partnership between learners and administrators, shown by the avoidance of external controls. Early evidence from these innovative examples suggests a high level of use by students and a corresponding respect for the centre and its facilities.

Also critical to the success of a learning centre is management of sound. The self-regulating building will manage dialogue and collaboration by providing areas that invite group activities where silence is not expected, with quiet zones adjacent to windows, or separated by shelving. Traffic through the centre can also be directed by varied arrangements of internal structures, to avoid a concentration of noise and movement in areas close to entrances.

Real and virtual spaces

It is sometimes thought that teaching will benefit from migrating into learning centres where 'real' and virtual learning can more easily co-exist. This is especially the case where the courses are in IT, as in the Millennium Building at Wolverhampton University, where individual, informal group and class-based teaching blend in one space, and software is used to link dispersed class members with their tutor. It is likely that the role of the tutor will become more of a facilitator of learning where this model is applied. However, bookable seminar rooms within a learning centre can offer a compromise.

Learning centre



Raised floor and ample perimeter cabling for easy access to power and data points. Roving support assistants replace an information desk.

- 1 Security swipe-out
- 2 Plasma screen for DVDs/presentations
- 3 Wired headphone
- 4 Security swipe-in
- 5 Ceiling-mounted information screen
- 6 Journal/newspaper/information leaflet racks and quick-reference books
- 7 Wired short-stay terminals
- 8 Multifunctional equipment print/copy/scan
- 9 Wireless hub for study garden
- 10 Wireless hub
- 11 Mobile interactive whiteboard
- 12 Desks for group work
- 13 Power sockets for recharging laptops
- 14 Wired medium-stay computers
- 15 Floor cabling can be adjusted to suit cluster location
- 16 Headphone storage
- 17 Desk cluster for quiet study
- 18 Informal seating
- 19 CCTV camera

This floor plan gives a prototype design for part of a learning centre. It does not represent a design in any particular institution.

Source: AMA Alexi Marmot Associates

“We spend a lot of time trying to change people. The thing to do is to change the environment and people will change themselves.”

Les Watson, Pro Vice-Chancellor, Glasgow Caledonian University

The Saltire Centre, Glasgow Caledonian University

Glasgow Caledonian University is Scotland's fourth largest university, supporting over 90 undergraduate and 40 postgraduate programmes. The university, which has a clear focus on widening participation in higher education, has raised £23 million for a new learning centre, which will be the single point of access for all student services in the university. The building reflects the core beliefs of the university in its design: that learning depends on dialogue and debate, and differences in learning styles are to be welcomed.

The Saltire Centre is designed to be the social heart of the campus, a place where students meet and converse as well as study. The design of the centre and the way in which it is administered recognise the social origins of learning and the need for interaction between learners on different levels and in different forms. It is also a self-regulating environment which places discussion on an equal footing

with solitary learning – it is the policy of the university to give students responsibility over their learning environment as well as over the way in which they learn.

The type of furniture and arrangement of tables and computers helps users to recognise the type of activity preferred on each floor – from social and interactive forms of learning towards the front of the building to quieter activities at the back. This transition between modes of learning is reiterated in the floors themselves, with silent learning the dominant mode on the top floor and social interaction on the ground floor, where the café is situated. The change is reflected in colour and design features, and supported by background audio cues.

The Saltire Centre overtly encourages conversation as the basis for all learning, and seeks to engage the whole community as co-learners. Its social area is the hub of the campus where essential support services are also located. It is this supported approach to learning that Glasgow Caledonian University believes will lead to deeper understanding of concepts and ideas.





Flexible designs for flexible learning

Furniture plays a significant role in enabling a learning environment to be flexible. To achieve this goal, institutions have frequently invested in bespoke furniture design. Some easy chairs in the Saltire Centre, for example, have been designed to house power sockets in the arms, so that groups of users can plug in electronic equipment and plasma screens. The arrangement of most furniture within the social areas of the centre, however, can be easily reconfigured to match the size and purpose of the group and, where a discreet meeting point is called for, an inflatable 'igloo' wall can be brought in to provide a sound baffle. Like the curved desks in the James Weir Building at Strathclyde University, these are custom-made items that are designed to support clearly articulated pedagogic aims.

However, even where standard furniture is used, combinations of circular and oblong tables, or palette chairs, as opposed to standard ones, will establish preferred uses of that space, so even in the most constrained circumstances, consideration of room layout and choice of furniture can make a significant difference to learning outcomes. Learners can be reluctant to change an inherited configuration, even when self-management of the space is encouraged, so they are likely to adopt the mode of learning signalled by the existing layout and type of furniture. Similarly, varying the arrangement of fixed computers can indicate the activities they are intended to support, from quick access to long stay, and acknowledges the equal importance of all types of use.





The Learning Grid, University of Warwick

The Learning Grid is located in converted offices in the University House, the centre of administration for Warwick University. The Grid, open 24/7 to student-card-holders, records approximately 10–15,000 entrances a week in term time.

The purpose of the Learning Grid is wholly distinct from that of the central library, where areas are set aside for quiet learning. This is a highly adaptable high-tech resource designed for group collaboration, which offers a mix of group and individual workstations, and mobile technologies: plasma screens and players for DVD viewing, interactive whiteboards, magnetic screens and document visualisers. The equipment is replicated on both floors and there are no zoned areas for particular activities – the ethos of the Grid is that students decide on the configuration of the space and the technology they require for their purpose, and can use it for as long as required. However, adjustable computer tables can be prioritised for wheelchair users.

This is a facility for students, staffed by students, which has no central control desk. Day-to-day running of the centre and meeting of requests for assistance are provided by students working part-time in the centre, and conversation, mobile phone use and consumption of refreshments are considered natural adjuncts to learning. Plasma screens on both floors identify the roving support staff and remind users of occasional drop-in workshops for skills development. The only bookable rooms are three set aside for workshops, presentations or student meetings – the rest of the space is open access, on demand.

The flexibility of the Grid places a requirement on the student support staff to be responsive and supportive and yet still be able to manage a high-volume open-access resource. A positive customer service ethos has been established, which is reflected back in users' attitudes towards the centre. At times of peak demand, the roving support staff proactively seek solutions rather than turning users away, and are trained to know when to refer enquiries to other expert agencies.





“We have created a culture of respect for users. Our student evaluation shows that they value being treated as competent individuals.”

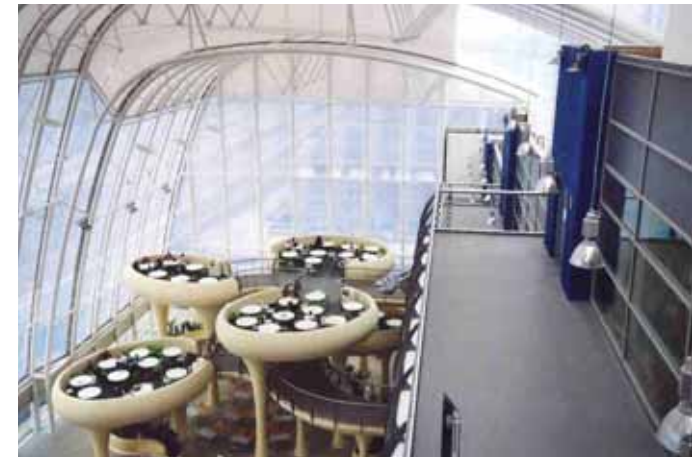
Rachel Edwards, Learning Grid manager, University of Warwick

South East Essex College

South East Essex College is an example of a further education college built around the concept of the flexible learning centre. The new college was completed in 2004, bringing together estate scattered over several sites into one town-centre building.

The college's senior management team saw in the new-build project an opportunity to improve the quality and flexibility of its teaching and learning provision. Curricular-focused flexible learning centres were designed as a series of 500-sq.m. open-plan modules, which could be linked and subdivided using soundproof glass partition walling into a range of different sizes. This enables a flexible response to changes in enrolment numbers for individual courses.

However, the adoption of flexible learning centres was also prompted by their potential to engage learners in a continuous flow of learning, within and outside timetabled sessions. Large enough to create a buzz, the learning centres have a constant staff presence – both academic and support staff – and, with access to IT, learners can benefit from working at their own pace. Each space contains a range of resources including IT, presentation and performance spaces, and seminar rooms which provide the opportunity for tutor-to-learner support sessions and for group tasks to be initiated. All areas and resources in the centres are bookable.



Social spaces

Well-designed social spaces are likely to increase students' motivation and may even have an impact on their ability to learn. High-quality space for informal learning will also enhance the profile of the institution with its target groups. For these reasons, social spaces are given a high priority in new designs, but this cannot happen at the expense of increasing the overall dimensions of the building.

Large, underutilised spaces already exist in most colleges and universities. If catering facilities, common rooms, even corridor space, are reconsidered as social meeting and group learning environments, institutions could both save on large-space provision and make a statement about their vision for learning as a pervasive and inclusive activity based on social interaction.

A community of users

Social spaces need not make distinctions between types of user. The principle of pervasive, communal learning, which sees both staff and learners as co-users of a space, is potentially achievable through the re-purposing of spaces which are currently allocated separately to staff or students, such as common rooms.

Emerging designs place emphasis on one high-quality social space as a central focal point in the building, which caters for the needs of all users of the building – visitors, staff, learners and potential learners of all abilities. The area is both a public facility providing meals and refreshments, and a place where learners and staff can meet for short discussions. Wireless enabled, it is not set apart from learning – student services may also be located adjacent to this space to take advantage of its widespread use. Learners' views are key to getting the balance of the design right, and their opinions should be sought at an early stage in its development.

Heat, light and ventilation

Modern building materials can provide environments that are both self-regulating and allow natural light to pass through. Natural light, maximised by the use of transparent membranes, atria or clerestory-style windows in corridors that are open to the full height of the building, is a notable feature of many new educational buildings, and one which can create an inspirational ambiance.

A new build should also aim to make efficient use of heating – heat from warmer environments, such as IT centres, can be recycled back to ground levels, into corridors or large social spaces, where it is more frequently lost.



Edinburgh's Telford College

With around 20,000 students, Edinburgh's Telford College is one of the three largest further education colleges in Scotland. Originally established in the 1960s, the college is currently dispersed over four sites. The new build, to be completed in spring 2006, will create a high-status learning environment on one site as part of the city's Waterfront development.

The Hub

Having opted for a high-specification wireless network, the college aims to utilise a greater proportion of available spaces as social learning areas. The building is U shaped with vocational teaching spaces along each arm. At the heart of the complex is the dramatic,



wooden-arched 'Hub' which provides a focal point at the entrance to the college. Student support services, counselling rooms and the reception are located within or to the side of this open refectory and social space. The transparent roofing membrane allows diffused daylight to illuminate the area, creating a warm, bright feel, and a high-capacity wireless network means that this can also become an informal working area for both staff and learners.

The Learning Streets

Along each access route on the first floor are the two 'Learning Streets'. These have alcoves set into the sides of the wide circulation space, where classroom activities can be extended in informal group working, or learners can 'touch down' to access work online before a class. The Learning Streets are wireless enabled, as is the entire

building, in the anticipation of more widespread ownership of mobile devices in the future. However, some alcoves have grouped arrangements of computers which learners can book online. Raised flooring allows cabling to be extended or amended in the future – hence the building has made provision for a range of scenarios, although use of the wireless network is promoted.

The design of these two spaces blurs the distinction between formal learning and social activities – the Hub and the Learning Streets make learning visible and active, and an integral part of being at college. Most importantly, they are spaces that learners can make their own.


“Learning is a remarkably social process. In truth, it occurs not as a response to teaching, but rather as a result of a social framework that fosters learning.”

John Seely Brown



Preparing for your project

Key points for senior managers planning a redesign of learning spaces



There can be no one blueprint for the design of learning and teaching spaces. The case studies in this publication show a variety of approaches, indicating that designs of physical spaces depend as much on the individual institution's vision for learning, its purpose, its learners, and the source and type of funding, as on a uniform set of requirements found across the post-16 sector. The variety may even be considered an advantage – when rethinking your own learning and teaching provision and the spaces it will inhabit, exploring differing approaches can help to clarify your own requirements.

However, some clear messages are discernible in these examples and from these it is possible to identify broad points of guidance:

“The strategic aspirations of all the key stakeholders will be more easily delivered if the estates management strategy and academic strategy are well co-ordinated and complementary.”

JISC eSpaces Study, University of Birmingham (2005)

“We are on the cusp of change, moving from teacher-centred to learner-centred models, from face-to-face to digital, from synchronous to asynchronous, from solo to group learning, coloured and improved by technology.”

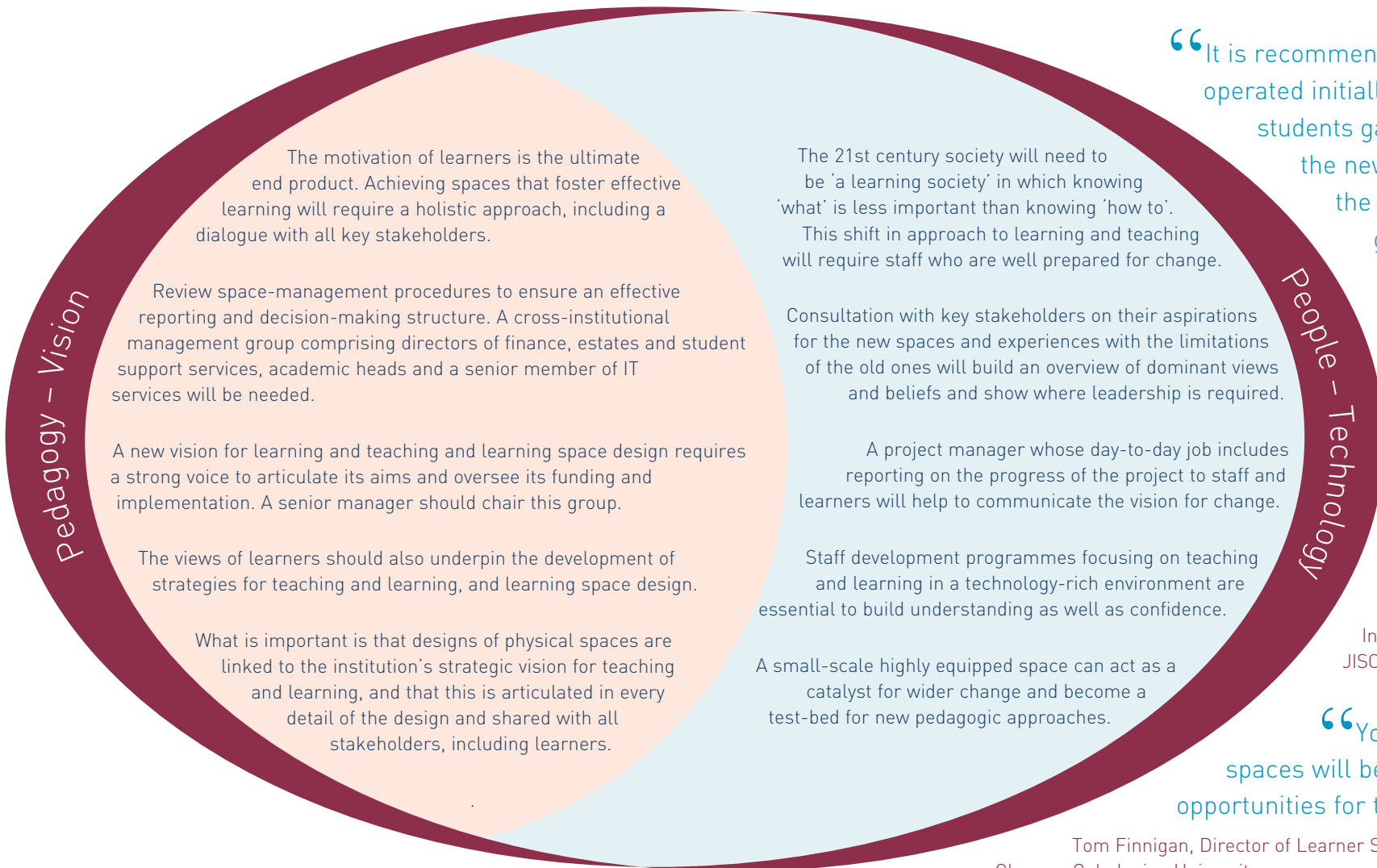
Alexi Marmot, AMA Alexi Marmot Associates

“[The] college that I'd rebuild would be something big and awe-inspiring that would make a lasting impression.”

FE learner quoted in *Realising the Potential*, Andrew Foster (2005)

Spaces are themselves agents for change.
Changed spaces will change practice.

Technology will change faster than you imagine.
 A redesign needs to reflect tomorrow's technologies
 rather than rely on today's.



“It is recommended that one or two pilots are operated initially... This will help staff and students gain experience of operating within the new environment and can provide the platform from which a set of guidelines can be drawn up.”

JISC eSpaces Study,
 University of Birmingham (2005)

“Building a 21st century model of learning involves all members of the institution in a process of change that requires more than short-term, small-scale projects.”

Innovative Practice with e-Learning,
 JISC (2005)

“You can't be sure how these spaces will be used. You are just creating the opportunities for things to happen.”

Tom Finnigan, Director of Learner Support, Learning Services,
 Glasgow Caledonian University

Sources of further guidance

AMA Alexi Marmot Associates for the Scottish Funding Council (SFC)
Spaces for Learning: A review of learning spaces in further and higher education (2006)

www.sfc.ac.uk/information/information_learning/spaces_for_learning.html

Architecture.com (RIBA)

www.architecture.com

Centre for Accessible Environments (CAE)

www.cae.org.uk

Commission for Architecture and the Built Environment (CABE)

www.cabe.org.uk

Department for Employment and Learning, Northern Ireland (DEL)

www.delni.gov.uk

Design Council

www.design-council.org.uk

Education and Learning Wales (ELWa) and Higher Education Funding Council for Wales (HEFCW)

www.elwa.org.uk

Higher Education Funding Council for England (HEFCE)
Estate Management Statistics

www.hefce.ac.uk/pubs/hefce/2004/04_45

Higher Education Funding Council for England (HEFCE)

Space Management Group: Phase One Reports

www.hefce.ac.uk/pubs/hefce/2005/smg

Learning and Skills Council (LSC)

World Class Buildings: Design Quality in Further Education

www.lsc.gov.uk/National/Documents/SubjectListing/CorporateandStrategic/PartnershipWorking/world-class-buildings.htm

Scottish Funding Council (SFC)

www.sfc.ac.uk

JISC

e-Learning and Pedagogy Strand

www.jisc.ac.uk/elearning_pedagogy.html

Effective Practice with e-Learning (2004)

www.jisc.ac.uk/elp_practice.html

e-Learning and Innovation Strand

www.jisc.ac.uk/elearning_innovation.html

Innovative Practice with e-Learning (2005)

www.jisc.ac.uk/eli_practice.html

JISC infoKit on Designing Spaces for Effective Learning

www.jiscinfonet.ac.uk/infokits/learning-space-design

Study on how Innovative Technologies are Influencing the Design of Physical Learning Spaces in the Post-16 Sector (JISC eSpaces Study) – a report to JISC by Birmingham University Learning Development Unit (2005)

www.ldu.bham.ac.uk/espaces

TechDis

Sources of Information for Estate Managers

www.techdis.ac.uk/index.php?p=6_9_20040610051012



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South East Essex College

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University of Warwick

University of Wolverhampton

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