Planning and Designing Technology-Rich Learning Spaces

Learning space design and development is a hot topic as our colleges and universities not only seek to provide 21st-century learning facilities, but look to optimise space to best effect and respond to learner expectations. Technology has a vital role to play in this.

Following levels of investment which provided the first opportunity in many years for the sector to upgrade its building stock, the current economic downturn also encourages the optimal use of existing spaces in a creative and cost-effective way. National and international engagement with others in the sector, in other phases of education, and in the workplace also afford institutions opportunities to refine the types of learning spaces 21st century learners need, what they know works, and what they think might work better.

The JISC publication *Designing Spaces for Effective Learning* (March 2006) reported on some of the projects taking place in FE and HE and provides useful guidance for those involved in developing new learning spaces. An excellent set of complementary case studies also showcase activity in the sector. The Scottish Funding Council has also published *Spaces for Learning*. These reports have provided a sound basis for the continuing exploration by FE and HE institutions of new possibilities for learning space provision.

The interest in learning spaces is not confined to the post school sector and also not to the UK. This infoKit looks at what is going on in UK schools and in education worldwide. We all have much to learn from the diversity of approach and practice that exists.

We hope that this infoKit will inspire you to think about what is possible and give you some practical advice on how to put your vision into practice. A major new build or refurbishment is something that most of us undertake only once in a career but collectively we have a wealth of experience that can be shared. This resource is not a guide to be read from start to finish in one go but rather it is to be dipped into by various people at various stages of the project to give you a range of ideas and practical tools and templates you can take away and use.

The infoKit is richly illustrated with case studies, images of buildings across the sector and a 'virtual tour' around an imaginary campus composed of spaces we find inspiring from a range of different institutions. This is an evolving resource and we welcome your feedback, examples and images to help its development. Please contact us at jiscinfonet@northumbria.ac.uk.

Anticipation

The buildings we design now will shape learning and teaching for the next century so it is essential that we look to the future. In the words of Les Watson, lead consultant on this infoKit, 'Decisions based on forensic examination of the past give us what we've always had'. It is therefore valid to consider whether, especially in the light of opportunities afforded by new technologies, there is a continued need for campus-based education.

Whilst the growth of IT, and social software in particular, provides a greater range of opportunities for virtual social interaction and learning, it remains a 'both/and' phenomenon that adds to, rather than replaces, physical face-to-face activities such as performance, presentation, discussion, and debate, as described here by Richard Florida:

‘The death-of-place prognostications simply do not square with the countless people I have interviewed, the focus groups I’ve observed, and the statistical research I’ve done. Place and community are more critical factors than ever before…the economy itself increasingly takes form around real concentrations of people in real places’ - Richard Florida, The Rise of the Creative Class1

This infoKit therefore takes the view that physical learning spaces will remain important for the foreseeable future. We look at what sector-wide and institutional factors may impact the way you choose to develop. We also look at how learner needs and our own understanding of learning
processes are changing and we look at what opportunities new technologies may offer before attempting to bring this together to show what it might mean to your build.

What's Going On In The Sector?

'In the next 30 years more people will gain formal qualifications through education than since the beginning of history'

Ken Robinson, Out of Our Minds

In general there is good news for education. Post school education is one of two booming businesses in these early years of the 21st century - the other being healthcare. We have more people participating in education than ever before and the future looks even brighter.

However, the growth in demand for post school education brings its own issues for institutions in terms of resources, particularly staffing, and facilities. These issues are compounded by a range of factors and top of the list for most is the level of funding. The amount of cash available per student has always been an issue for the post school education sector. The 'unit of resource', for as long as most of us can remember, has always been reducing and increased numbers have not always produced increased income, indeed in some cases more students has even resulted in financial penalty. This financial pressure is compounded by levels of increased accountability required from institutions by various bodies - not just in the area of QA but also from a constantly tightening legislative framework, such as employment law and systems of detailed accountability from government and funding bodies. The resulting resource pressure makes it more important than ever before that institutions develop effective and efficient approaches to their main activity of teaching and learning - using space as a part of this strategy. The important contribution that space can make to overall strategy is widely acknowledged, such as in the introduction to the LSC's prospectus for the 'Agenda for Change' by Mark Haysom.

'A network of colleges that put customers first. A network famous for its world class buildings and technologies... and a sector that plays a broad role in enhancing local communities'

The Learning And Skills Council

The Role Of Universities And Colleges In Society

'Taken together these facilities may be seen as part of making the institution into a more balanced community. This implies an enlarged estate, though one with a compensating income stream for users.'

Space Management Group

The role of the post school sector in the social and economic development of our nations is one that is taken very seriously by government and there is every indication that our campuses will play an increasing role in this. We already have some striking examples of campuses such as those at Telford College and John Wheatley College that are playing a vital role in urban regeneration and widening participation and we see similar examples of HEIs contributing to economic development. (Both of these institutions feature as case studies within our resources collection). The growth of University Science Parks, sometimes known as the 'Cambridge Phenomenon' is following a global trend.

'Rather then HEIs becoming physically dispersed, we suggest it is more likely that other organisations of all types will wish to cluster round them, both physically and conceptually.'

Space Management Group

The Space Management Group also predicts that this trend will increase not only in science and technology but also in the social sciences and subjects allied to the creative industries.
Within the traditional campus there is greater demand from students for facilities such as cafeterias and retail outlets.

**Where Is The Money Coming From?**

The financial pressures are not all negative. The funding bodies in both FE and HE are making significant sums available.

In England, these funds come from a variety of sources that include tuition fee income and specific HEFCE investment projects like the Centres for Excellence in Learning and Teaching.

The Scottish Funding Council has made £207.9 million additional capital available for estates projects over the years from 2006 to 2008 some of which will inevitably fund new or refurbished learning spaces.

The Learning and Skills Council is also making efforts to facilitate a building boom in English FE Colleges with the aim of replacing the entire estate by 2013.

'**We propose to... continue capital expenditure to improve the estate, and so drive up learner recruitment and achievement**'

'**The LSC is therefore developing proposals that, if agreed by Government, would materially accelerate the capital driven modernisation process so that the whole estate could be substantially renewed and modernised by 2013**'

The Learning And Skills Council

Sentiments from the LSC not only commit to funding, but see estates developments as having broad institutional, and ultimately sectoral, benefits. Indeed the LSC commitment is to not merely continue to provide financial support for estates developments in FE but to increase the rate at which this happens.

Against the often articulated fear that such investment seeks unrealistic improvement for the funds available the LSC, commenting on value for money, states: **'value for money' should not be equated with 'cheap and cheerful'.**

Case Study Resources

- [John Wheatley College](#)
- [All Case Studies: Finance Sections](#)

Whilst capital injection of funds is no replacement for increased annual revenues it is possible, and important, to use such funding imaginatively to develop estates for the future which improve the learning, teaching and services of institutions without increasing revenue costs. An approach that synthesises efforts for improvement in key areas of human activity, application of technology, and improvement in estates is most likely to get the best from all three areas. But, inevitably - and this is the biggest issue that has to be faced in all of our institutions - this will require significant change. We consider this further in the following section and we recommend that you also look at the infoKit on Change Management.

Some universities and colleges are engaging in partnerships outside the sector or finding innovative ways of raising additional funding. John Wheatley College in Glasgow had a major new library development funded by the local authority and the council provides staffing for the library as a resource shared between the college and the local community. The same college has raised significant funding for a new build by engaging heavily in the environmental sustainability agenda.
Building Schools For The Future

'School buildings should inspire learning. They should nurture every pupil and member of staff. They should be a source of pride and a practical resource for the community.'

In the post school education sector we are not always well informed about developments in our schools. There is now considerable activity in the school sector with the development of learning (and teaching) space. The UK capital investment in school buildings in 1997 was £700 million. By 2005-06 the Building Schools for the Future (BSF) programme will be investing capital at the rate of around £5 billion a year in new school buildings. BSF is the biggest government investment to improve the UK’s school estates for over 50 years. The aim is to rebuild or renew every secondary school in England over the next 15 years. The BSF programme’s vision is to bring about a transformation of 14 to 19 education by building 21st century schools which provide environments that inspire learners.

An important point about BSF is that it is not just a ‘buildings’ programme. BSF also involves significant investment in information and communication technology that, combined with further investment in staff development, seeks to promote a step-change in the quality of secondary school provision. There is an important general lesson here from the BSF initiative that applies to all phases of education. The co-ordinated development of buildings, ICT and staff is a powerful combination that should be part of the thinking of all major estates developments. 21st century buildings cannot be agnostic to ICT - they must facilitate its use now and in the future - and nor can they ignore that staff need to have the knowledge and skills to capitalize on the opportunities of the resource.

Technology and BSF

There is already more ICT equipment present in schools than there has ever been before and it is starting to bring about the desired transformation of learning and teaching. Children being taught with ICT in new and exciting ways are also learning about ICT and acquiring new skills to enable them to participate in the e-economy. Technology is seen by BSF as a necessity for all children to reach their full potential:

The mission for ICT in schools is:

'To help all children achieve their full potential by supporting every school in England to become a centre of excellence in the use of ICT for teaching and learning and for whole-school development.'

Such a mission requires that ICT is seen as an integral part of each building project and not separate or bolted on but embedded. A key question posed for Local Education Authorities by the government is 'Does the local authority's vision allow access to ICT as and when it is needed for teaching and learning?' The mantra of anywhere, anytime access to ICT facilities heard frequently throughout education must be served by all new building projects. The BSF programme provides some pointers of some ‘must dos’ for schools making proposals for new buildings:

- Cabling, equipment and other services must allow true broadband capacity to be delivered to the classroom and school office.
- ICT infrastructure and equipment must allow the use of media-rich learning resources. BSF provision must include appropriate servers and sufficiently powerful PCs to enable use of current and future digital learning materials.
- Level of equipment provided. Personalised/individual/independent learning is inconceivable without access to ICT. ICT provision is essential to develop differentiated, personalised approaches to learning and the aim for BSF schools should therefore be to have sufficient and suitable equipment to allow individual access.
- ICT for management. Data capture, management (MIS) and transfer are key to delivering the personalised learning agenda and to developing a new relationship between the department, partner organisations, local authorities and schools. BSF schools should be supplied with
appropriate ICT infrastructure and equipment to enable efficient management and allow those schools to work with the data collected.

- Specialist provision. ICT is a powerful tool for promoting social inclusion and delivering educational opportunity beyond the school gates. BSF ICT provision should include specialist equipment and software and home-to-school links, (and links between schools and hospitals and other locations) to support pupils with special needs and to transcend the need for learning to take place at a fixed physical location and time.

Whilst not an exhaustive list, these provide useful discussion points in planning your project. Although in post-school organisations the need for broadband is less of a discussion and more of a given (provided by SuperJanet5), there are clearly discussions to be had about whether this should be delivered locally through wires or through the air.

What’s Happening In Institutions?

In this section we look at some of the forces inside our institutions that relate to learning space provision and the impact of new technologies.

The range of changes that colleges and universities are faced with is enormous and the interaction between these forces produces high levels of complexity. So a key issue for all post 16 institutions is how to deal with this complexity. Complex environments do not respond well to detailed analysis, especially where this leads to overly complex strategic responses that those involved in implementing them find difficult to understand. A feature of complex environments is that they consist of many strands and the temptation is to separate these out and develop separate responses to each strand. The resulting ‘strategitis’ does little to clarify the complexity and can leave staff and students confused about where the institution is going and what it is trying to achieve. It is often at the interface between disparate issues that really useful development can take place.

An alternative to the analytical approach is one of synthesis - where major forces, such as reduced funding, sector growth, and new technology, are considered at a macro level. Such macro forces suggest profound shifts are needed like a move from supply-driven to demand-given services, or from teacher-centred to learner-centred organisations. Such major change can only be achieved through changes in people and their behaviours, the application of technology, and the design and configuration of the estate. It is through the interaction between strategies for these three areas that real change can be achieved.

People In Our Institutions

‘...trying to introduce change in a University is like trying to move a cemetery. You can expect no help from the people inside.’

Graham Leicester, Policy Learning

This quote from Graham Leicester's Policy Learning paper suggests that staff are a barrier to change in our institutions. We do not believe that this is the case. Many staff have hopes and aspirations for improvements in our education system and the success of our learners. However, they are faced with a dilemma. They work in an education system that largely treats everyone the same whilst staff know that we all have different landscapes of intelligence.

An education system that acknowledges individual difference rather than ignores it demands a new approach to what it provides and how it provides it. This is an education that is about educating for understanding and assessing understanding using a broad range of performances, emphasising learning and personal growth. Whilst many of our staff do share such aspirations for a learner-centred education system that aims to develop the variety of talents of learners we seem to lack the capacity to achieve it.

As practitioners we are torn between an objective, target-driven, performance assessment culture that reduces achievement to a single assessed dimension and our own intuitive, value-driven beliefs, and will to do it better. It is not surprising that initiatives such as the ‘implementation' of new technologies
rarely achieve their aspirations. As Cuban notes: ‘When teachers adopt technological innovations these changes typically maintain rather than alter existing classroom practices’.

The pace of change in our institutions is acknowledged to be slow by those who manage, and too fast by those who work in the system. One reason for this may be that there is something unreal about expecting to change behaviours and implement new technologies, in an effort to move to a service and student-centred way of working, in the same old environments that limit us to teacher-centred approaches. Space may have a much more central role in change than we previously realised. The spaces in which we work, live, and learn can have profound effects on how we feel, how we behave, and how we perform. These spaces can also limit the possibilities of our activity restricting us to old modes of working and thinking. The learning spaces that we develop have the potential not only to change the way that we work but also to play to our individual difference and preference. If we design our learning spaces with the variety that exists in our learners only then will we be providing the maximum opportunity for each and every learner to achieve and enabling every member of staff to innovate.

The innovator's dilemma, identified by Clayton Christensen, is a real issue for us. We currently operate a relatively successful education system and moving to new approaches may not be easy as Christensen tells us that new innovations rarely perform as well as existing systems at the outset. If our buildings, technologies and behaviours are new and innovative they will, most likely, initially perform less well than current facilities. Hence the dilemma. If we base our future use of technology, staff and buildings on available evidence it's unlikely that we will ever change at all. Conversely if we base our decisions on an unknown future it may not measure up to current expectations. It is our view that faced with this dilemma we have to be prepared to take some risks. We have to imagine the learning futures that we wish to create - and be prepared to be wrong. This is a tall order for those in our colleges and universities charged with the responsibility of success. Within the Imagination section we give some ideas on Developing The Vision to move our thinking out of current paradigms.

Management Issues

The Space Management Group (SMG) identifies the three sets of internal factors that affect an institution's approach to space as changes in:

- academic disciplines
- pedagogic approaches and
- managerial factors.

Their pragmatic, but in many ways disturbing, view is that it is the managerial factors that will have the greatest impact on space utilisation over the next few years. We include this section not to contradict what was said earlier about moving forward based on a macro level strategic approach but simply to highlight some of the issues you will have to face in promoting the first two as the more significant drivers. Many of the SMG observations are based on the process of incremental change to an existing estate but should be borne in mind when considering new build projects.

‘But insofar as students come to see themselves more as paying customers...they may expect classes to be provided at times convenient to them, rather than at times which allow institutions to maximise space usage.’

Space Management Group

The SMG notes that for the most part individual departments no longer control 'their' space except where the space is for highly specialised functions. They suggest that this can result in reducing teaching time as students spend more time moving around the campus and may reduce opportunities for informal learning, e.g. immediately after a lecture, and reduce staff/student social contact.

The extended teaching day seen in most institutions offers obvious efficiencies in the use of space (changing opening hours from 9.30-17.30 to 8.30-18.30 is the equivalent of almost 1.5 days per week teaching time). However it seems that, despite the popularity of technology-supported 'anytime,
anywhere learning', there is still a reluctance on the part of students and staff, often due to childcare and transport considerations, to physically attend early and late sessions.

Students as paying customers may also have views on their learning that do not accord well with current views on what makes an effective learning experience. The SMG notes that students often object to a reduction in lectures.

'The demise of the formal lecture has long been predicted, based on empirical findings as to its general ineffectiveness as a means of learning. Nothing we have heard or seen, however, suggests that this will happen in the foreseeable future. ... More creative design of lecture theatres (with horseshoe-shaped layouts and better eye contact, for example), and easier to use technology, means that lecturers are able to present material in a variety of formats, and to demonstrate processes, in ways that once would have been impractical. These improvements may partly account for the lecture's continued popularity.'

Space Management Group

The SMG also notes that in many HEIs the need for all academic staff to have their own office, with space for their own books, is still seen as an important aspect of academic life. The original design of such offices was usually predicated on the need for the room to accommodate small tutorial groups leaving them as large spaces for sole occupancy but inappropriate for teaching most current seminar and tutorial groups.

Technology In Our Institutions

Educational organisations have accumulated enormous amounts of technology over the years but the key question, especially where the investment in technology precludes expenditure on other priorities, is whether this investment has been made strategically or not. How has it improved efficiency or competitive advantage, and how do we measure any added value? The cost of technology in FE and HE over the years is difficult to determine but it is undoubtedly high, and increasing. A Becta study on ICT and e-learning in FE published in 2006 reported that around 80,000 computers were purchased in 2006 in FE. In addition to this there has been enormous growth in network availability in post-compulsory institutions, mostly funded centrally, as well as high levels of expenditure on administrative and learning software funded locally. It is clear therefore that, viewed across the whole post-compulsory sector, spending on IT directly (on hardware, software, systems and networks) and indirectly (on training and initiative projects) runs to hundreds of millions of pounds. At this level of investment IT should be transforming our institutions.

So how successful have we been in exploiting the opportunities afforded by IT? Has IT transformed processes and services in universities and colleges for the better? Whilst there are some examples of best practice that can be held up as beacons, for example Newark and Sherwood was one of the first colleges to have an extensively-used intranet linking all staff to essential systems and communications, the overall picture does not show high levels of innovation. But, whilst most institutions are not at the leading edge of IT use, portals, effective administration systems and the use of IT for learning improvement is now more common in both universities and colleges. One key to success is implementation of institution-wide systems. Silo thinking and behaviour are a major impediment to success with IT. New technology can be the glue that unites the units of the institution - but like most glues it needs to be applied liberally.

Some Questions On IT Provision

As IT facilities become widely available to all of us at the individual level, institutions need to examine where they should focus their efforts. In the pioneering days of IT in education, when students did not have personal access to technology, providing rooms of computers made sense. However taking this track has dragged institutional resource managers into a recurring nightmare of replacement that sucks vital resources into providing more of the same and reduces the opportunity for development in the core infrastructure that users cannot provide. What aspects of the technological fabric should we invest in and what should we expect students to bring with them?
The rapidly developing use of social software by our students is a key feature of the Web 2.0 phenomenon. At a broad-brush level within the institution this is a world that is less about systems and more about services. It inevitably causes us to think in terms of service provision and to start to question firstly whether we are providing really useful services that meet the needs of our users, secondly to wonder whether there are others that, in a service-oriented IT world, can more ably (and cost effectively) provide those services, and thirdly, as similarities between educational institutions are much greater than their differences, why can’t these services be shared between groups of institutions, or even the whole sector.

The move to services then raises at least two key questions for institutional managers:

1. Should we continue to do everything or can we outsource (or right source) some of our provision?
2. Could we provide better IT services if we shared the task with other providers? (A sort of in-sector outsourcing).

These are strategic questions that go beyond the day-to-day provision of client devices and should form part of the consideration of the development of the estate and its associated infrastructure.

KPMG has produced a report for HEFCE on the potential of shared services in HE and the University of Liverpool has led a project under the HEFCE Leadership, Governance and Management Programme (LGMF 028) to investigate this further.

The e-Framework for Education and Research is an initiative by the JISC and Australia’s Department of Education, Science and Training (DEST). The primary goal of the e-Framework is to facilitate technical interoperability within and across education and research through improved strategic planning and implementation processes. The initiative is based on a Service Oriented Approach (SOA). Further information on SOA can be found on the JISC e-Learning Focus website under the Framework and Tools Strand. JISC has also created an animation (available in QuickTime & Windows Media formats) that describes the benefits of the Service Oriented Approach. It provides a very clear explanation of the SOA model and is recommended viewing!

**Modelling Current And Future Space Demands**

Whilst one of the key purposes of this infoKit is to encourage you to be radical about your vision for the future we recognise that your institution will inevitably be benchmarked against norms for the sector. The UK HE Space Management Group's website provides an excellent source of information about such norms and its reports section also includes information about the LSC approach to space utilisation in FE.

The SMG has produced the following useful summary of how various internal factors may affect future demands for space:

<table>
<thead>
<tr>
<th>Driver</th>
<th>Reduced space use</th>
<th>Changed use within envelope</th>
<th>Increased space use</th>
</tr>
</thead>
<tbody>
<tr>
<td>Institutional planning &amp; management</td>
<td>Extended teaching day/week/year</td>
<td>Changed teaching/research mix</td>
<td>New central infrastructure functions</td>
</tr>
<tr>
<td></td>
<td>Staff working away from institution</td>
<td>More space for taught postgraduate and research students</td>
<td>Higher standard/more extensive student facilities</td>
</tr>
<tr>
<td></td>
<td>Better space management techniques</td>
<td>Increased community use of facilities</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Increased student-staff ratios, leading to unit space savings</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Remodelling and better</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
design of new space

<table>
<thead>
<tr>
<th>Changes to teaching and learning</th>
<th>Workplace-based and itinerant learning</th>
<th>Changed approaches to library use</th>
<th>Partnerships with other institutions</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>New mix of teaching space sizes</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>IT use leading to more flexible space use</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Increased social/group work space for student-led learning</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Disciplinary Changes</th>
<th>Size reductions and improvements to equipment</th>
<th>Changed equipment needs</th>
<th>New research fields requiring specialist facilities</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Specialist space for social science and humanities work</td>
</tr>
</tbody>
</table>

What Are Learners Doing?

'We have to stop pigeon-holing the learning experiences.'

Helen Gale, University of Wolverhampton

There is an emerging belief that young people in western society now relate horizontally, or laterally, more than vertically. They relate more effectively to their friends, to the internet and to the interactive media in general than they do to 'authority' or to their families. (David Watson, 'What ever happened to the student experience')

Good communications are at the heart of successful relationships. It is no surprise then that young people make extensive use of Information and Communications Technology (ICT) in fostering and developing their networks of relationships. The students who attend our universities and colleges today have a view of technology that is integrated into their daily lives.

'Conversation is where all learning begins'

Douglas Blane, It's a University But Not As We Know It

'Students are drawn to spaces that are open, inviting, and stimulating spaces where they become fully engaged in the conversation and in the excitement of sharing new ideas'

Carole C Wedge and Thomas D Kearns, Creation Of The Learning Space

Institutions with a high proportion of non-traditional learners may rightly criticise an over-emphasis on how young people learn but there is no denying that people in all walks of life interact with information and communications technologies in ways that were unimaginable 20 years ago. The challenge for educators is to find ways of making the simplest and most ubiquitous tools support the learning experience.

For most educational institutions, however, whilst this integration, or embedding of technology, is what they are trying to achieve, it remains somewhat elusive. ICT is often something that is 'over there' in a separate computer lab, or bolted onto traditional library settings. It seems obvious that a goal of ICT integrated into curricular activity is only likely to be achieved if the technology is ubiquitous and deeply embedded in our learning spaces.

'While for previous generations IT was a kind of exotic overlay or an optional tool, for the Net Generation student IT is essential. It is clear that IT and Net Gen students have had a mutually influential-almost symbiotic-relationship'

Malcolm Brown, Dartmouth College
The Rise Of Social Learning

Integration into everyday, mainstream activity is certainly how many of our students see ICT. The arrival of new services (often referred to as 'Web 2.0') has helped to remove many of the barriers in traditional web authoring and seen a massive rise in the uptake of web authoring and collaboration. This new wave of social activity has been termed various things e.g. Social Software, Social Media and Social Computing. The key word is however 'Social'. Elsewhere on the JISC infoNet website you can find a brief overview of the Social Software phenomenon including a number of links to examples of the genre.

The social software used by the Google-eyed, del.icio.us technorati that we currently teach is highly successful because it meets two key requirements of the modern student psyche - it enables them to participate and values their contribution. These two 'benefits' are ones identified by creative class people, interviewed by Richard Florida in his research that formed the basis of his book 'The Rise of the Creative Class', as the most important things that creative people want.

It should come as no surprise that our student body values opportunities to contribute, and that such opportunities prove to be strongly motivational. The tactics that many tutors in FE and HE have been taking to increase the extent and use of techniques such as problem-based learning, group assignments and project work makes real sense for a generation that values contribution and participation. In turn such teaching tactics have repercussions for the sort of spaces that we provide both for the student-teacher interactions that are needed and for the 'out of class' group work that these teaching strategies demand. Often the default location for such 'out of class' work has traditionally been the college or university refectory, but we can't help feeling that new learning spaces should do better than this!

A key point here is the changing relationship between the teacher and the learner. We are all too familiar with the picture of active teachers and passive learners. The conclusion has to be that the new learning paradigm that is student-centred requires changed behaviours by both teachers and learners. A key question is how far is that changed behaviour hampered by current learning facilities and how can new facilities be configured to enable this change?

Spaces For Engaged Learning

As educators we recognise the wide diversity of students that we now have on our campuses and we wish to enable student choice and to empower students to make choices. An important aspect of such choice is where, when and how students study. Providing a wide variety of study options is important and many institutions have woken up to the fact that it is better to provide such facilities and enable choice (especially for those students who may not have their own place of study) with spaces that are welcoming, inspiring, technology-rich, and that also provide the human support for learners. However, choice is not empowering if the options provided are only specified and developed by the learning provider - learners need to be part of the design process as considered in the section Implementation: Working With Others.

'It is increasingly important that colleges and universities engage learners in a dialogue to better understand their perspective. Institutions make massive investments... for the sake of meeting students' wants and needs, basing these decisions on assumptions is risky'.

'Only by understanding the Net Generation can colleges and universities create learning environments that optimize their strengths and minimize their weaknesses.'

Diana and James Oblinger, Is It Age Or IT?

If institutions fail to provide engaging learning environments then students will vote with their feet - and at one level this may be fine for the competent experienced learner. But HEFCE, supported by the Higher Education Academy, recently conducted research into the student experience of learning in HE which showed that a large number of students appear to take a surface approach to learning; that is that they engage in learning in ways that are opposite to those that tutors are trying to encourage.
'It is often as students are leaving their classrooms that important conversations begin; conversations that have the potential for reinforcing new concepts or ideas that may have been presented in the classroom as students discuss their own understanding.'

Jo Dane, Monash University

Our aim should be to design learning spaces in such a way so as to encourage learning that is:

- continuous from formal classroom-based work to informal study areas for individual or group study,
- situated close to student learning support (for example by locating tutors’ office space nearby and having learning resources staff, IT support staff available) and
- supportive of students engaging in deeper learning.

This view is supported by JISC research that shows that students who are using a variety of technologies in flexible ways to support their learning do adopt a deep approach to learning. For example, whilst reading through their lecture notes students follow up references online. This online activity often leads to further reading and many of students verify website information against books and e-journals. Students also frequently share and test this new information with their peers using these discussions to modify their understanding, adopting a researcher/collaborator model of learning.

At the heart of this activity is a conversational, collaborative model of learning that we should strive to nurture, not just support, in our learning environment development. Diana Laurillard has done much research in this area and gives a brief overview in the Explanation of the Conversational Framework. The importance of conversation in the process of learning is illustrated in the figure below which has been modified from a talk by Professor Stephen Heppell. The diagram is interactive - use the sliding scales to profile where you are now, print this out and then profile where you want to be.

**Supporting Learning**

As well as designing spaces conducive to learning it is equally important that we are able to supply the types of support students need when they need it. There are many examples across the sector of institutions providing support in new and innovative ways:

---

Glasgow Caledonian University has grouped student support services together in a one-stop-shop close to the student social area in the Saltire Centre.

[Case Study]

---

Edinburgh’s Telford College has staffed help points in its Learning Streets where students can get IT support. The College has also grouped student services and careers advice around the social Hub.

[Case Study]
Newcastle College has taken a very innovative approach to front-line IT support in its centre for HE level students. IT facilities are provided in a modern cafeteria/bar area and the bar staff provide first level IT support that can deal with many routine issues. This approach has proven popular and very cost effective.

*Click on the thumbnails above to view an enlarged annotated version in our Flickr Photo Gallery.*

**Student Expectations**

'The freedom of use for students and lack of rules mean it is encouraging rather than prohibiting.'

Margaret Weaver, St. Martin's College

Your students have an increasing variety of expectations, experiences, and learning styles and your technology-rich learning spaces can exploit this richness. There is also an increased use of social software and environments such as Second Life in learning and teaching. Your 'digital native' students expect this type of engagement and it is important that there is an intelligent approach adopted to their use without a blanket blocking of access to such sites.

Conversation is central to the collaborative model of learning and the redesign of your learning space is an ideal opportunity to provide resources that support and encourage active learning.

We have already mentioned the idea that building developments have to be closely aligned with technology developments and staff activities. Where this alignment occurs there will be greater synergistic benefit for the organisation. The natural extension of this synergy is to recognise that there are important strategic links between key policies and strategies of the institution. A fantastic 'learning' building speaks volumes about the approach that the institution takes to learning and teaching and should support the approach that is articulated in the learning and teaching Strategy, but it should also be part of the technology strategy of the institution, its recruitment and retention strategy, its marketing strategy and its strategy for engaging with the local community. A successful technology-rich learning space is a powerful vehicle for providing an holistic view of the institution that radiates and reflects its strategic stance. When planning their Learning Gateway, St Martin's College clearly articulated their vision and based this on their institutional strategies. Our resource collection includes a detailed case study from St Martin's.

There is more on identifying trends that might affect your particular build and opportunities that may be open to you in the section *Imagination: Developing The Vision.*

'The vision for the Learning Gateway is based on the College's Corporate Plan, its Learning and Teaching Strategy and a set of pedagogical principles that put learners and learning first. These recognise that learning is complex; it does not take place in a vacuum and that space combined with technology and appropriate support can provide the optimum conditions for active learning.'

Margaret Weaver, St. Martin's College

When considering what is going on out there with learners, it is useful to hear (and listen) to what the students themselves say. As part of its e-Learning Programme, JISC commissioned a series of studies which give a voice to students. They demonstrate how technology has become an essential part of their learning lives and that they use different types of learning space as appropriate (not just the task in hand but how they feel). Here are some examples of video case studies from the Learner Experiences project:
• **videos and transcripts**: Laura Hotchkiss (use of technology and space at home and at Glasgow Caledonian University); Paul, Simon and Beth (use of technology and space at University of Central England); Jenny and Emma (University of Wolverhampton, use of different tools to produce e-portfolios); Amanda (technology and group work at Strathclyde University)

• **Audio Logs** show the daily use of technology by students in different subject areas

**Entrepreneurship and Business Start-up Spaces**

Many universities and colleges provide facilities for business start-up and spin-out companies. Some of these facilities are open to anyone who has a decent business idea and the enthusiasm to see it through whilst others are restricted to alumni and current students/staff; this depends on where the funding for the space has come from. Larger universities are able to provide specialist laboratory facilities that young start-up businesses cannot afford to kit out to meet stringent health and safety legislation. For example the University of Manchester offers wet labs in their Core Technology Facility.

These young businesses offer a bridge between the academic and business worlds; they work in, and are supported by, both sectors and frequently offer employment and placement to students. Clients within the Hatchery at Northumbria regularly take on student placements; it is a very common occurrence as they are aware of, and familiar with, the level of talent and the skill sets available to them in particular areas. This sort of relationship works both ways - and can prove mutually beneficial for both the Hatchery client business and the placement student.

They view being a part of the university or college as very important to the success and growth of their businesses.

The working space needs to be functional, stimulate innovation and creativity and still project a professional image to the business world; this they seem to manage as the case studies and images demonstrate.

[www.flickr.com](http://www.flickr.com)

Many of these spaces are hosted within the university or college buildings, often starting out being attached to a particular faculty or department, but a good number are in science parks or buildings specifically renovated to host new start-ups. Some renovations add to the ambience, for example the Arches and Broadstone Mill which are part of the University of Manchester facilities.

**Funding sources**

Funding has usually been sought for the setting up of the Entrepreneurship and Business Start-up spaces and to support the young businesses in their first year of operation. External funding enables the university or college to waive rental and support costs, provide free places on relevant courses, and provide local businesses to act as mentors. The amount of funding can be quite substantial; for example the University of Surrey has raised over £12 million over two years from grants/angels/venture capital.

Examples of funding sources are:
European Regional Development Fund (ERDF) and for information on how the fund is managed in the North West of England
Higher Education Innovation Fund (HEIF)
Regional eg North West Development Agency (NWDA)
Research & Development grants - Business Link
Business Angels

The case studies have further examples of financial support and how it has been used.

Technology

Technology is a key component of the package offered to business start-ups; this may be offered via the university or college standard service or, in the case of this being too restrictive, by an independent supplier (who may be one of the start-up businesses).

Examples on what is offered include:

Northern Lights UCLAN

- email for communication with clients and colleagues (able to respond immediately and have a record of the conversation)
- integrated office software to manage the business (also helps with the Tax Return!)
- e-commerce for marketing and sales
- wired and wireless internet connection offered for PC (supplied), laptop and mobile devices (client owned)
- telephony is usually included with some examples of a full call answering service that adds to the professional business image. For example, SETsquared at the University of Surrey provides its client businesses with a telephone minding service via the switchboard at Reception providing an additional layer of professionalism and creating an excellent impression for external callers
- photocopying and scanning facilities that are usually linked to the email system
- videoconferencing facilities
- plasma screens can be used to highlight meetings, courses and social gatherings. For example, the Northern Lights Reception area at UCLAN has an electronic plasma screen noticeboard advertising workshops and other activity as well as highlighting the businesses located within the space. A business of the month competition is also held at Northern Lights and advertised on the screen
- electronic notice board for individual offices. Where the businesses are located in individual offices (usually in 'grow-on' spaces), technology can be used to show 'out-of-office' and enable visitors to leave a message. InfoLab21 at Lancaster University uses the HERMES II interactive office display. There are 40 display screens sited outside rooms throughout the building giving information on the office residents and allowing notes and messages and other electronic material to be recorded. HERMES II has been tested and developed at Lancaster
  - email lists and newsletter. Incubator Centre staff commonly use e-mail lists and newsletters to keep in touch with their clients; this is especially important for virtual clients (those who use access the services but rarely visit the premises)
- online collaborative tools. The University of Glamorgan has set up a blog - GBlog - to encourage SMEs, including the start-up companies, to interact with each other and with
University staff. For more information on using online collaborative tools in this way see 'Using Collaborative Online Tools for Business and Community Engagement' infoKit.

- room booking systems - for example, SETsquared Surrey and SETsquared Bristol use Steelcase which is a Room Wizard booking system that allocates the space and notifies visitors of the availability, or otherwise of the individual rooms.

Facilities

SETsquared University of Surrey

Most incubator or start-up spaces are open-plan with individual offices supplied as 'grow-on' space for when the businesses have a few employees. The open-plan office allows for more people to use the space but also encourages an atmosphere of entrepreneurship, innovation and creativity. In these spaces, the young companies will support each other for example with web design or e-commerce.

A café area can frequently be found within the open-plan office with a range of comfortable seating provided. Where the start-up space is located within a Business Park or consists of individual offices, then a shared café is generally provided.

Hot-desking is preferred by some as it offers a cost efficient alternative to a permanent desk and storage space and is especially appropriate where the client (start-up business) prefers to be, in the main, a 'virtual client'.

Small, enclosed mobile office units can provide privacy when required.

Support

A range of support services are offered as part of the package. These include:

- early advice and guidance on producing a business plan
- regular meetings to ensure that the business is on track and to identify and additional support required
- training in specific areas (may be a module from a taught course) for example e-commerce
- introductions to local support
- Business Club
- provision of a business mentor
- advice on funding opportunities
- social activities ('Pizza and Beer' meetings seem to be particularly popular!)

These spaces have a buzz that is partly the space itself, partly the enthusiastic entrepreneurs, but also due to the support staff who are dedicated to the success of the start-up businesses.

What's Going On With Technology

'Increasingly, all our learning environments are beginning to coalesce via the ubiquitous computer. It provides visual stimulus, audio provision, read-write materials and increasingly a virtual world, which means that a student can appear to be umbilically connected to life via a screen. Access to
technology is at the centre of much of our planning.'

Helen Gale, University of Wolverhampton

'With the appropriate use of technology, learning can be made more active, social and learner-centred - but the uses of IT are driven by pedagogy, not technology'

Diana and James Oblinger, Is It Age Or IT

Elsewhere in this infoKit we have stressed the importance of co-ordinated strategies that link the efforts (and capabilities) of our staff with the buildings that we build and the technologies that we deploy. These three threads of activity are deeply intertwined and the effect of each is ampliﬁed by co-ordinating its development with the other two. However, there is no argument that the fastest moving of these three is technology. And in the context of building technology-rich learning spaces it is technology, due to its greater rate of development and change, that stands to lose if its trends and directions are not considered in new build and refurbishment projects. Hence the need to look at some trends here.

**Hype Cycles**

A Hype Cycle is a graphic representation of the maturity, adoption and business application of speciﬁc technologies. The concept was developed by the Gartner Group who state that hype cycles aim to separate the hype from the reality, and help decision makers to decide whether or not a particular technology is ready for adoption. The Gartner Group produces a range of hype cycles for different business areas that are regularly updated and they have given their kind permission for us to include the [Hype Cycle for Higher Education, 2005](#) as part of this resource.

The phases they identify are:

- **Technology Trigger** - a new technology ﬁrst comes to market
- **Peak of Inflated Expectations** - hype about the new technology raises over ambitious expectations that this technology will revolutionise the way we do x, y or z
- **Trough of Disillusionment** - early adopters identify all sorts of practical difficulties and ﬁnd that the (inﬂated) expected beneﬁts aren’t immediately materialising
- **Slope of Enlightenment** - people persevere with the technology with a more realistic set of expectations
- **Plateau of Productivity** - the technology reaches maturity, early teething problems are ironed out and people understand how to use it to best effect

**Technologies For Learning**

"Information technology is allowing instructors to ﬁnally remove the yoke of expository lecture, freeing them to work with students in more intellectually challenging ways"

Ken A Graetz and Michael J Goliber, Designing Collaborative Learning Places

There is general agreement, quite rightly, that technology should be the servant and not the master - ICT should facilitate better learning and better teaching. If, as expressed elsewhere, learning and teaching are conversation-centred then technology, especially the C in ICT, can enable conversations and develop a sense of community that is broader than the classroom. Technology can be used to extend the conversations of the classroom to the broader learning experiences of self-directed learning, individual and group learning extending the classroom into the student residence, library, and home. The journey we travel is one of technology that is ubiquitous, useful, and used naturally by teachers and learners to enhance their experience. But it is journey and not a destination. Some of the ideas below on technology and its development may help you in designing technologies into your learning spaces - rather than bolting them on later.

'Students appreciate being able to work in their own way; the technology affords both privacy and also differentiation'
Let Students Bring Their Own

It is no accident that computers are called personal computers - they are personal tools. The underlying assumption that we seem to have made in education is that a computer can be used by a student for a limited period of time - their work saved on a network drive - and then they can go away resuming their work at a future date on a different machine at a different location. In our view this is a reductionist mechanistic way of using technology. If technology is to be the creative tool that we know it can be then a student has to own it and have continuous access to their collected works and resources. They need to be connected to their ideas and writings by having a sense of ownership - the contents of their computer are their developing thoughts, concepts, ideas and expertise. Build your buildings to welcome student technology.

Provide The Tools For The Job

Often we tend to think of applications like word processors as productivity tools. The reality is that they are creativity tools. We say this because the key applications that students and staff use in their everyday work bring one common but powerful factor to their ways of working. Good software tools allow the user to edit their work, and if they are really good they make that editing very, very easy. Editing something on screen means that the user must have thought about what is already there and decided that, for whatever reason, they wish to change it. This is reflection and reflection is thinking - what computers do is encourage thinking and reflection by facilitating editing.

When thinking what software to put into your facilities ask students what they need and would like. Students have a wide variety of learning styles and landscapes of intelligence - and these change over time. Provide access not just to the usual desktop environments like the word processor but also give access to social and mobile learning software.

An increasing number of our students are digital natives and have high expectations to work with a range of applications, environments and digital media - don't disappoint them! After all if learning is social then why restrict the use of the very software that encourages social interaction? We need to engage all learners with our institutions - the greatest threat is that our software and systems become irrelevant to our learners.

The Future Is...

...Mobile

The fantastic rate of growth of mobile technologies and the networks that support them will continue. Mobility clearly has repercussions for our students and our learning spaces.

UKOLN has an article on wireless networks 'Mobile networking: 1G to 4G' which gives a useful overview and additional references. There is also an article on wireless community networks by Becta.

Access to social software such as MySpace and YouTube will become more widely available from devices other than computers such as mobile phones. Initially this will enable improved anytime anywhere access to a wide range of online applications and resources.

The revolution will come when serious search facilities also become available on handheld portable personal devices (see Search 2.0 below). The repercussions are greatest for 'teaching' space where holding the attention of students can become an issue. There are also repercussions for what we think we are doing with students. When all information is accessible the role of the educator changes drastically. The educator is no longer a delivery vehicle. They are a construction worker and scaffoldor helping students to construct sound conceptual frameworks and deconstruct those misguided ones they have picked up earlier. This is a much more diagnostic and co-operative role.
Search 2.0

Portable devices will give continuous access to Web 2.0 software and services. JISC infoNet has a brief introduction to Social Software which includes applications such as MySpace. There is a parallel development described as Search 2.0.

Developments in the semantic web (defined by W3C as "an extension of the current Web better enabling computers and people to work in co-operation") underpin the development of Search 2.0 which uses meaning-based search engines and (still in an early phase) intent-driven search tools. As these tools develop there will be more emphasis on search tools that treat not just text but also images, videos and other information formats as accessible resources and reportable results.

Examples include:

- Searchmash from Google which features search extension as the user continues to type
- Live.com from Microsoft
- meaning-based engines like hakia which do not use keywords to search but are based on the typing of direct questions into the search engine
- Yahoo mindset is an early example of an intent-based engine

All of this is likely to ease access to information for students and staff and aid findability, making the research phase of the learning process even more accessible to all students. It will however make demands on your network and the network permeability of your building. The increasing numbers utilising online environments such as Second Life in their learning and teaching will also impact network use but it is important that this is viewed intelligently and that IT departments do not simply block such sites without first investigating their use and the learning and teaching implications of such action.

Video And TV

What videoconferencing didn't do, telepresence just might. Telepresence is an emerging technology that upstages video conferencing by providing a 'real feel' presence of people at remote sites such that body language and the nuances of facial expression become part of the meeting. It's as if the remote participants are really in the room at the same meeting. Images of others are 3D and life size, movements are smooth and natural and detail is high quality. The use of video conferencing was always a challenge to the need for new spaces - will telepresence decrease the need for, or nature of, new spaces? The most likely scenario is that new spaces will incorporate telepresence facilities so that remote learners can really start to feel included.

Internet Protocol TV (IPTV), which has been quite slow to take off so far, may develop as bandwidth developments pave the way for more extensive use of it. IPTV could have enormous implications for the delivery side of the educational experience and making IPTV available in our modern learning facilities will be essential. This will of course be interactive TV and not passively consumed programmes of one-way instructional information.

Smaller And Faster Devices

Hardware continues on the up with faster and faster processors and will continue to do so. Moore's law will have a finite limit but we are unlikely to reach it as organic and nano computing are rapidly becoming a reality. As more devices are developed at ever cheaper cost there will be billions of connected devices for example Microsoft's Zune puts connectivity and community at the heart of its technology.

Technologies In The Big Brother Building

In future the network will be the building
Integration and convergence is now going beyond IP (Internet Protocol) telephony with the concept of the 'connected real estate' that Cisco has developed. Cisco Connected Real Estate (CCRE) involves all aspects of building management control right down to lights in individual rooms being controlled automatically across the network. It's like the building management system has come of age by becoming ubiquitous, digital, and network based.

**Big Brother will be watching you**

New wireless devices such as CCTV cameras are becoming available that impact how we manage our spaces - especially those for open access student learning. Wireless CCTV cameras that also have 2 way sound facility can be located anywhere and easily moved. They provide a way of monitoring activity and sending voice to control and advise students remotely. Students can also use these devices by asking for help, support and direct questions without having to go to a desk and leave the place of study. The promise of these devices is a much more flexible approach to support and security.

**Whatever it is, wherever it is you'll be able to track it**

Radio Frequency Identification (RFID) is starting to be used widely in business for tasks such as inventory control. In the Saltire Centre at Glasgow Caledonian University, and other libraries, it is being used for identification of resources such as books and laptops. It is an improvement on the old magnetic strip ID as it is more sensitive and more reliable. There are two types, active and passive:

- **Active tags** have an internal power source which enables a 'conversation' between the tag and the reader; this means that they are more accurate and can be used over greater distances than passive tags.
- **Passive tags** do not require an internal power source due to the minute electric current that is part of the incoming wave having enough power for the circuit to power up and transmit a response. Passive tags are lighter and cheaper than active tags.

The next stage for RFID gets personal when we use it in student ID tags or student cards. Active RFID in student cards will record their use of facilities and space preferences and can link individuals to use of specific resources. There is a potential problem that it might generate so much data that we never find time to make sense of it but at the macro level it could give very informative usage data that shapes provision continuously over time.

**The chattering classes**

There is a great deal of work going on to find better ways to control computers and other devices. Whilst it is possible to control some applications on some machines by voice to a certain extent at the moment this is likely to become a dominant way of interacting with a computer. If total voice control does become a reality it has considerable implications for the layout, organisation and soundscape of your space.

**Technical Infrastructure**

**The network is vital**

'There is a lot to learn about how to use... technologies effectively in the new spaces that are opening up. Two key directions are letting people do things together, and joining up the physical spaces with the informatic spaces. New ubiquitous and mobile technologies, with built-in networking, allow us to do both.'

Dr. Tony Hall and Professor Mike Sharples, University of Nottingham and Peter Lonsdale, University of Birmingham

If the future is mobile, the network is even more important than ever before.
We already have more bandwidth at college/university and at home than we ever imagined possible. All of these wireless applications and developments will be supported in the near future (late 2007) by faster wireless networks. 802.11n will deliver 100Mbits/sec and the development of 540Mbits/sec is already underway. This is set to grow to even greater levels over the next few years. For example, France Telecom has a fibre upgrade project costing 270 million euros to completely upgrade the network in major French cities by 2009 making 100 Mbit home connections the norm.

However wires will not go away as higher speeds increase still, and guaranteed Quality of Service will be needed for some applications like telepresence. Such high bandwidth networks will enable greater use of soft technologies such as Voice Over IP (VOIP) - any new build or refurbishment should think seriously about VOIP, further information is featured in our Social Software resource.

'The changing face of education: mobile and ubiquitous learning'

Helen Gale, University of Wolverhampton

Software-based implementations such as Skype are a cheap option and as more suppliers offer alternatives to Skype this use of the network is starting to really happen, as are improved building management and environmental control systems that are network-based (see Technologies In The Big Brother Building).

There will also be new applications many of which will be so 'local' they will be personal. The network, wired and wireless, should therefore be considered as integral to any new space development. And it needs to be open. There will be a growth in network services, as in applications, that are tailored to the individual. Students will want access to these wherever they are so considerations about the network need to consider not just your network but access from external wireless networks to students in your new building.

New generation computer applications will be hybrid, using both the power of the client device (which is more and more likely to be owned by the student), and the network. These applications will make use of the facilities of both the web and the desktop taking the best of each to perform the relevant task.

**Technology Planning**

You will need to consider whether or not you have the necessary expertise within your institution or need to obtain additional support. Assistance with analysis of learning modes, advice on technology infrastructure, and development of the Project Brief are all areas where outside help is available.

Recognise the limited lifespan of much technology - most probably the space will outlive the technology. The centrepiece of the room should be the learning not the technology (which should be supporting and ubiquitous but not domineering).

Purchase of the hardware and software should be left until the last moment to ensure that the latest versions are available.

"Above all make it learning led"

'I think that it is pretty good the way they have staggered IT through the building and I do use the mix of areas - there is even a silent area which I used a lot when revising'

Northumbria University student

The key theme, as mentioned at the start of this technology section is that the primary consideration should be the learning that you want to take place in the space. It is worth considering doing some learning mode analysis to help develop the scenarios that you would like to see in the space or that you see already in the institution and that work well (some techniques to aid scenario development are covered in the Imagination section). This will also help inform your work on 'Space Data Sheets' which are featured in the Implementation section.
Technology should be there to support learning, should be ubiquitous but not overpowering. It is clear that the technology has a limited lifespan of around three to seven years (this is further explored in *Pace Layering* in the *Imagination* section) - the space will outlive the technology and will also have to accommodate the next generation of technology - whatever that might be.

Further discussion covers planning your network, device usage and hardware.

'Do: Embrace latest technology
But bear in mind: Cutting edge won't be cutting edge on delivery'!

Christine Braddock, Matthew Boulton College

Bringing It Together

'We need to start, then, by asking not 'what buildings do we want?' but instead 'what sort of education do we want to see in future?' We need to ask not 'how many classrooms do we need?' but 'what sorts of learning relationships do we want to foster? What competencies do we want learners to develop? What tools and resources are available to us to support learning?'

Futurelab 2006

'School buildings should inspire learning. They should nurture every pupil and member of staff. They should be a source of pride and a practical resource for the community.'

Building Schools For The Future

Your buildings are the physical representation of the mission and values of your institution, and the teaching and learning facilities should exemplify your Learning and Teaching, and IT strategies. Learners should be inspired by their environment.

You can learn a great deal and get inspiration and ideas not only from those in your sector but from other sectors within the UK and worldwide. You won't want to mirror the whole but you can take parts and amend to fit your vision.

The following list looks at some types of learning activity you may wish to facilitate and what kinds of technology can support this:

<table>
<thead>
<tr>
<th>Learning Activity</th>
<th>Technology</th>
</tr>
</thead>
<tbody>
<tr>
<td>Use of online resources (e.g. from Internet, VLE or JORUM)</td>
<td>Data Projector; Internet access</td>
</tr>
<tr>
<td>Annotation and contextualisation of a pre-prepared presentation</td>
<td>Interactive Whiteboard, student tablets with wireless access and windows annotation software</td>
</tr>
<tr>
<td>Review notes/annotations/comments from previous sessions</td>
<td>Interactive Whiteboard, student tablets with wireless access and windows annotation software</td>
</tr>
<tr>
<td>Individual or group access to software and online resources as needed</td>
<td>Wifi connection; Power points to plug in own laptops; Laptop charging trolley with laptops to loan</td>
</tr>
<tr>
<td>Multiple choice questions or feedback on a range of options</td>
<td>Voting System Follow this link for a video case study of use at the University of Strathclyde</td>
</tr>
<tr>
<td>Note taking in on-site real work environment or off campus</td>
<td>Digital pens (use special paper to write notes and can download to PC or send text to mobile), or PDAs with writing pad</td>
</tr>
<tr>
<td>Brainstorming and group development of assignment or project</td>
<td>Informal learning space, laptops with network access, mind mapping software</td>
</tr>
<tr>
<td>Group collaboration between students on work experience</td>
<td>Network access, email, IM, YouTube</td>
</tr>
<tr>
<td>Presentations by and Q&amp;A sessions with experts from elsewhere</td>
<td>Video-conferencing or telepresence; web-cam; synchronous collaboration tools</td>
</tr>
<tr>
<td>Interaction with specialists off-site including</td>
<td>Synchronous collaboration tools such as Convoq, Instant</td>
</tr>
</tbody>
</table>
voice contact; online 'chat' and annotation of slides etc

A structured set of tasks to be worked through individually or in groups

Combining a presentation to a large class with small group work

Working in groups and recording collaborative effort

Working in groups and displaying/presenting to others

Practical demonstrations where learners need to be able to see close up detail

Presentations or demonstrations that learners can replay to digest at their own pace

Groups using different resources or undertaking different activities at the same time

Informal group work/social learning

Presenter; Horizon Wimba or Macromedia Breeze.
Follow this link for an overview of such tools by Robin Good or see spoken word project at Glasgow Caledonian PC or laptops with network or wifi access. LAMS (Learning Activity Management System) or similar
Flexible partitioning; movable furniture; data projectors and screens all round room so students can sit in groups facing any direction. See an example at the LSE Robinson Rooms
Simple whiteboards; Interactive whiteboards; PCs or laptops with access to a wiki
Interactive whiteboard; data projectors and screens all round room so students can sit in groups facing any direction
Web-cam footage displayed on screens or individual laptops
Podcasting; storage of video on VLE

Multi-channel audio visual; multiple screens; differential lighting; wifi; laptops. See an example at the University of Sussex InQbate CETL
Wifi; power sockets for laptops; flexible furniture; catering facilities

Imagination

All the feedback we've had from new build projects suggests that one of the elements people find most difficult is imaging a very different type of learning space. It's easy to imagine doing what you do now in a nicer environment but how do you imagine the unimaginable?

This section of the infoKit looks at a range of techniques for stimulating imagination and creativity alongside examples of what others have done. It will come as no surprise that this is the most image-rich section of the resource. We also look at business processes and how they can be improved to support activity in new types of environment. Most importantly at this stage of your design we also help you do a reality check on your 'blue-sky' thinking before you commit to a build.

Innovation In The Sector

'Research the sector and look outside the sector for innovative approaches that fit with the values and objectives of the project'

Margaret Weaver, St Martin's College

There is much exciting new build and refurbishment in the education sector and most colleges and universities are more than willing to share their experiences and take you on a tour of their facilities. One drawback of so much happening is - where do you start? This infoKit draws heavily upon the experience of others and a range of resources in different media aims to bring some of this experience to you. These are linked in context throughout the infoKit, and are also grouped together in our 'resource collection' which also features hints and tips on how you might get the best out of the suite of resources available.

The Flickr Photo Gallery features a large collection of images from around the UK to give you ideas and inspiration on the design of your space. The images are richly described, tagged and organised in 'sets', to facilitate quick and easy location of material relevant to you. The photo sets are linked
throughout this resource (particularly in the 'Aspects Of Design' section), and we've included an overview of how to get the most out of the gallery.

Our **Virtual Campus Tour** provides an illustration of collective good practice from a number of institutions, linking them together in a specially-created floorplan for our fictional institution.

As well as the visual resources, a series of structured **case studies** document the experience of a number of institutions.

All these supporting materials can be found in our [resource collection](#) which also features links to a wealth of other publications, websites and reports in this area.

**Centres for Excellence in Teaching and Learning (CETLs)**

The main aims of the CETLs are to reward excellence in teaching practice and to invest in that excellence so as to make real benefits to teachers, learners and the institutions. The centres funded by HEFCE are varied; some are a single subject area (e.g. Computing, Genetics), others are pedagogy-based (such as Assessment for Learning). The CETLs have invested in refurbishment or new build of their associated learning spaces and many are exciting, innovative developments. It is worthwhile visiting their websites (or their actual centre) to see if any of their ideas are appropriate for your developments. Further details of the CETLs and associated resources such as case study materials can be located in the resource collection.

**Aspects Of Design**

"You don't have to be uncomfortable to learn"

Diana Oblinger

Interiors in universities and colleges traditionally have had a very institutional feel to them with uniform colours and uniform furniture throughout. The setting out of classrooms has followed a pattern established within the church of rows of seats and desks with a teacher at the front of the class addressing the students as a preacher might address his congregation.

It has become increasingly apparent that this 'one size fits all' approach is not always appropriate or conducive to the 21st Century learning experience. Oblinger talks about the importance of harmonising space with learning theory. She recommends that the space and the furniture within it should be flexible enough for quick reconfiguration; that there should be sensory stimulation (as 'antiseptic' environments do not focus attention) and that comfort is a major consideration (as discomfort distracts us from learning). Technical support should be available and the space should be 'de-centred' with no 'front' of the room - this is to encourage a focus on learning, not experts. She also emphasises that an holistic approach should be taken - the entire campus is a learning environment.

Taking all of these factors on board it is important to spend time on planning and designing the learning space in order to achieve the best possible outcomes.

---

**flickr**

This section introduces you to images held in the JISC infoNet Flickr Photo Library - click on an image to open a larger version in the Flickr repository (NB. these do not open in a new window so you will need to use the back button on your browser to return to this page). Further information on how we've structured the collection, and help on how to navigate around the photo library can be found in our [resource collection](#).
The Importance Of Good Design

The majority of staff and students (more than 60 per cent) agreed that the cosmetic and environmental features that impact most upon the way they feel and behave were the decoration, furnishings and furniture within the buildings.

'good quality higher education requires good quality environments'

Design with Distinction - The value of good building design in Higher Education22

The report by the Commission for Architecture and the Built Environment (CABE) cited above reinforces the importance of providing a quality environment to your users. In a time of competition within the marketplace it is important that you endeavour to gain as much of an advantage as possible and the establishing of an attractive and innovative learning space could prove to be an opportunity to do that.

Mark Haysom, Chief Executive of the Learning and Skills Council, expressed this when he said; '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'.

Design is of course a very personal issue and you will need to work closely with your team of specialist advisers to ensure that your design reflects your vision and instils a sense of unity and harmony throughout the build. We hope however that the following quotes and examples may give you some ideas to help you along.

We recommend that you think hard about what is essential to your vision at this stage as interior design elements are often the first items to fall by the wayside if finances become tight as the project progresses (our Reality Check section includes a look at Value Engineering).

Use Of Colour

'Instinctively we tend to move towards light and colour...'

Randall Fielding23

There are differing approaches to the use of colour in learning spaces throughout the sector. Colour can create mood, it can also signal the demarcation of a space - from floor to floor or indeed on the same level.
Glasgow Caledonian University’s Saltire Centre uses different colours on each floor and this provides a visual aid to signal to users the differences in purpose of the areas they are leaving and entering. The university supplements the use of colour with audio prompts at entrances to reinforce the changes in space.

Edinburgh’s Telford College has chosen to use colour and indeed paint generally very sparingly. They made the decision not to use paint on the majority of their interior walls, this means cost efficiencies for the future - with smaller maintenance overheads. What they have done, however, is use small amounts of colour at the entrances to each of the sections within the college and this gives an effective visual flag that users are moving into a different area.

Matthew Boulton College in Birmingham uses vibrant colours throughout the building providing a bright, contemporary feel. Different colours are used in different areas and wall colours are complemented by seating and floor covering in sympathetic tones.

Use Of Colour

Our Flickr Photo Gallery contains many more images from a range of institutions illustrating their use of colour.

View full image set

View full image set as a slideshow

Further guidance on how to use our Flickr resource can be found in the resource collection

Furniture
'If properly designed and placed, furniture is more than a place to sit; it can be a strategic asset'

Paul Cornell

Furniture and soft furnishings can make a difference to how staff and students feel about the spaces and hence make a positive contribution to learning and teaching.

It's important to make sure that you don't just replicate what you have in place already. It is fine to do this if you are convinced that what you have got cannot be improved on but if this is the case it is unlikely that you would be embarking on this type of project in the first place.

Think about your current lecture theatres for instance and how they could be improved to increase flexibility of use as well as to support better communication within classes and improve the learning experience. Jamieson, Dane and Lippman suggest that if you are going to go for traditional stepped seating then make sure it is designed to rotate so that students can easily turn around and work with the students behind them - thus enabling more interaction and discussion. This type of approach can offer much more flexibility for classes of all sizes.

'A key to academic engagement is to minimize the separation between living and learning'

Assessing Learning Spaces

The ubiquity of technology has implications for the types of furniture you require. Consider health and safety aspects for furniture that will specifically be used with technology - you want to try and avoid an outbreak of back and posture problems in your users. Tables for monitors and other equipment should be of an appropriate design to cope with the myriad of cables that might be connected to the equipment - avoid trailing wires. You may like to consider using 'power furniture' - innovative seating that allows the user to plug electrical equipment directly into it.

It is important when buying furniture to ensure that you bear in mind what it is going to be used for and the extent to which it is likely to be used. Those chairs may look very state-of-the-art and those tables may be very groovy but there are a number of questions you should ask. Are they durable? Are they comfortable? Are they the correct height (for use with laptops if required)? It is easy to have your head turned by the attractiveness of something only to find out after delivery that it's not really fit for purpose. Similarly with regard to durability you should give consideration to the materials used - are they easily maintained? Are they washable? Food and drink is becoming much more acceptable in learning spaces so you need to consider the potential implications of spillages.

You should think about how often you expect to replace pieces of furniture and budget accordingly. Some organisations keep replacement furniture in stock but you may not have the budget or the space available to do this. You don't always have to buy new furniture. If your budget is tight you may want to recycle furniture you already have, if it is suitable for the new space. There are creative possibilities for recycling furniture from elsewhere too. Edinburgh's Telford College, for example, has recycled furniture from the old Scottish Parliament Building for use in the College's library space.

The University of East London uses a variety of furniture throughout its Library and Learning Centre. General bench type furniture is provided for IT areas with provision for the tidying of cables and the off-floor storage of PC base units underneath. Benches with power points give students the potential to plug in laptops and other equipment. Round tables are provided for group work and these
can be cordoned off by students using the 'Space Oasis' furniture with built in screening which provides comfort as well as privacy. In-floor power points provide extra flexibility for the students in the space. Seating is varied from individual chairs on wheels to soft sofa-type seating, to more traditional computer chairs - all available in a range of bold colours.

North Hertfordshire College offers a great deal of flexibility in some of its furniture. A mix of computer and funkier cafeteria-style chairs can be seen in areas that offer the opportunity to both work on PCs and sit in a more social café-style environment. Other seating is provided in a variety of colours and shapes; portable pouffes can be moved easily and curved sofas provide opportunities for more comfortable discussion. Flexible screens can be moved and placed around tables to provide privacy for group work or one-to-one discussions. Tables of differing shapes are used, some of which offer cable holes for tidying of hanging wires. Power points in floors allow maximum flexibility for use of the furniture.

Putting furniture in 'difficult' spaces does not have to be a major problem for you. Don't despair if your space has pillars scattered throughout, for example. There are workarounds - Northumbria University has built furniture around the pillars in its library building. The library has a variety of seating, including couches and pouffes on wheels, ‘funky’ stools and a mix of chairs and bean bags. All of the seating is easily moved so that students can use it in a variety of formations to best suit their particular requirements.

Furniture

Our Flickr Photo Gallery contains many more images from a range of institutions illustrating their choices of furniture.

View full image set

View full image set as a slideshow

Further guidance on how to use our Flickr resource can be found in the resource collection

Flooring

There are a number of flooring options that you may wish to opt for. Again it is important to consider the potential use of the flooring. Is it likely to have a lot of traffic? Is it in an area that allows food and drink? Are spillages likely to be a regular occurrence? Is it a practical work space (e.g. lab, workshop)?
Issues to factor in include anti-slip capabilities and ease of maintenance, for instance choose the colour wisely as light colours can result in high maintenance overheads to keep clean. There are flexible approaches to take, for instance if you would like carpet but you think it might not be practical for the space then carpet tiles may be an option so that individual tiles can be replaced as and when necessary.

Neil Gow, IT Development Manager at Newcastle College, recommends that if you have installed a floating floor to accommodate moving data points and other services in the future then you need to ensure that the floor panels and carpet tiles are of a size and shape that permits such flexibility. You may otherwise find that your 'flexible' approach means you need to re-carpet the area after making changes.

Matthew Boulton College has a mix of flooring throughout the building, from practical and hardwearing floor tiles in the reception area through to shiny vinyl flooring in some corridors and carpets in others. Floor coverings in rooms reflect the type of activity that occurs in the space, e.g. easy clean vinyl in labs. A variety of colours are used throughout and some flooring has a mix of colour to represent the demarcation of space.

Stephenson College has used natural toned floor tiles throughout the building. The colour complements the general natural colour scheme of the College and contributes to the sense of light and space. The floor covering offers robustness and easy maintenance.

Warwick University also offers a variety of flooring in its Learning Grid. Stairs are perforated metal with occasional underfloor lighting. The stairs lead on to vinyl flooring in similar grey tones and again occasional underfloor lighting. Shiny stone style floor tiles are used in the atrium area. Carpet tiles are used in other areas within the space.

Our Flickr Photo Gallery contains many more images from a range of institutions

www.flickr.com/Flooring
illustrating flooring options.

Video: View full image set

View full image set as a slideshow

Further guidance on how to use our Flickr resource can be found in the resource collection

Lighting

Lighting when used correctly can create ambience and a good environment in which to work. It can illuminate a dark corner and can be used to separate a space.

Natural lighting and ventilation not only eliminate the need for energy consumption, they also help boost productivity and reduce illness and absenteeism related to sick-building syndrome.

Peter James

Stephenson College uses both artificial and natural lighting. The use of glass throughout gives a sense of light and air. Stairways are lit by wall mounted lights. Downlighting is used to complement the sky light windows.

The University of East London uses a variety of lighting in its Learning Resources Centre. Lights hanging from the ceiling, supplement the natural light that comes through sky lights and large exterior glass windows during the daytime. There are stand alone small lamp post type lights adding illumination to work areas. The bookshelves have lights on top of them shining on to the book stock.

The University of Warwick’s Learning Grid uses a mix of clear and coloured glass internally and
.externally encouraging a light and bright environment. Downlighting is used extensively and the stairways and floors also feature built in uplighting.

The Saltire Centre at **Glasgow Caledonian University** uses a range of lighting. The desks in the 'Base' area are illuminated in different colours to represent different areas of activity. Large umbrella-style standing lamps are used to illuminate many of the tables on the ground floor. A mix of up and down lighting is used around the stairways and on the different levels. Spot lights are positioned to best illuminate areas that may otherwise be shaded - for instance the inflatable pods. Large windows are also a feature of the space and provide a source of natural light.

**Lighting**

Our Flickr Photo Gallery contains many more images from a range of institutions illustrating aspects of lighting.

[View full image set](#)

[View full image set as a slideshow](#)

Further guidance on how to use our Flickr resource can be found in the [resource collection](#).

**Accessorising**

**The Use Of Art, Ornaments And Plants.**

The use of art, whether commissions of professional artists or the display of work by students within your organisation, can help to create a comfortable environment. Other attractive features such as ornaments and plants can also add to the general ambience of the space. You may feel that putting delicate **objets d'art** in areas where there is a high volume of users may be dangerous with regard to potential breakages but anecdotal evidence suggests where users feel ownership of a space they also feel protective of it and the fixtures and fittings within it.

**Accessories**

Our Flickr Photo Gallery contains images from a range of institutions showing examples of art, plants, ornaments and other accessories.
Acoustics

Staff and students in the focus groups identified some negative influences on their feelings and behaviour associated with cosmetic and environmental factors. These included problems with...acoustics and noise.

Design with Distinction

The management of sound levels within a building can be a real balancing act. Acoustics need to be of an appropriate quality for learning and teaching activity. It is also important to encourage social interaction throughout the building whilst at the same time controlling the potential impact of excessive noise. Sound factors can be managed in a number of ways; Glasgow Caledonian University used foam ceiling baffles in the Saltire Centre and others in the sector are using a variety of baffles and soundproofing throughout their spaces. The scraping of chairs across floors has been identified as a major source of noise in a number of buildings and the most straightforward way of dealing with this is to fix rubber stoppers to the bottom of chair legs. Further information can be found in Building Bulletin 93 produced by the University of Exeter's Centre for Energy and the Environment. This sets out information on Acoustic Design of Schools which can be applied to other educational buildings. When budgets tighten and savings need to be made in areas it can be tempting to remove sound insulation from the shopping list - our advice is to think carefully before you do this. You may save money in the short term but this can result in long-term headaches (literally!) for users of the space.

Acoustics

Our Flickr Photo Gallery includes images illustrating some acoustic features.

Further guidance on how to use our Flickr resource can be found in the resource collection

Techniques To Aid Imagination

The education sector has one of the most complex environments in existence. As well as wanting to provide stimulating learning spaces we also need to provide world-class research environments, social learning spaces, office space, catering and retail outlets, sports facilities and specialist working environments such as medical, hairdressing and building trade facilities. This presents a huge challenge but it also means there are numerous places we can look for inspiration. This section looks at techniques to stimulate new ways of looking at the issues and the section Innovation In The Sector looks at some real-life examples.
UK higher education is distinctive in being one of the few sectors that can plan on long-term ownership and use of its facilities and can therefore reap the full benefits of wise investment in high-performance buildings. Failure to invest will not only create a long-term cost burden, but will also disadvantage UK universities and colleges as more international competitors begin to take sustainability seriously. (Peter James 27).

Opportunities For Change

'Develop a Vision and find a way of delivering it'

Christine Braddock, Matthew Boulton College19

All of us that work in education know what our schools, colleges and universities are like. We have a model in our heads about what they do and what they look and feel like. But as outlined in the Anticipation section, the current high level of activity in new builds is an opportunity to bring about fundamental change. Of course we need to be able to imagine what the results of that change might be. What are we trying to achieve? This is not an easy task as we tend to be focused on what is and what has been rather than what can be.

Edward De Bono expresses this well in the context of universities: 'The huge bulk of our intellectual resources are devoted to the past. This is almost the sole occupation of universities. By definition 'scholars' need something to be scholarly about and that means the past. Book review pages in the more worthy newspapers are at least three quarters filled with books about the past: biographies, period pieces, political memoirs, etc. This is hardly surprising. To write about the past you only need some skill as a writer: the past is there to described. To write about the future also needs some skill as thinker.'28

'It is time to give more time to the 'design' idiom. You can analyse the past but you need to design the future. Otherwise it may be no better than the past.'

'Any new idea that does not raise a howl of protest is probably not a good idea. Those who are comfortable in the use of the old idea find it difficult to see the inadequacies of the old idea. If you have to imagine new benefits and you cannot achieve this effort of imagination, you have no choice except to resist the new.'

Edward De Bono, New Thinking for the New Millennium28

Whether you agree with De Bono or not there is no denying that when embarking on such a significant project as a new building or a major refurbishment then thinking outside the box that we are in (or perhaps even throwing the box away!) is a good idea at least at the outset. It is the 'skills as a thinker' that De Bono mentions that this section is concerned with. Each subsection below presents ideas or tools for thinking about the future and has the potential to help you have new ideas, describe them for others to understand and then maybe build them into your project. The importance of being future focused in developing the vision, and practical detail, of your project cannot be overemphasised. Whilst we do not know what the future holds we do have the opportunity to shape it through what we design, and we need to be bold about it.

Exploring some of the techniques considered here may help you develop those nascent ideas that you already have, but may not have clarified, and enable new ideas to emerge. You may also want to look at the section on Creativity in our Process Review infoKit.

Imagineering

For your project to have significant impact it should aim to 'break new ground' and have some innovative and exciting aspects. And for that you need to start with your dreams and imagination - the following has been adapted from Frank L. Baum's description:

'Imagination has brought mankind through the Dark Ages to its present state of civilisation;
Imagination led Columbus to discover America;

Imagination led Franklin to discover electricity;

Imagination has given us the steam engine, the telephone, the car, and the computer for these things had to be dreamed of before they became realities;

I believe that dreams - daydreams, you know with your eyes wide open and your brain machinery whizzing - are likely to lead to the betterment of the world. The imaginative child will become the imaginative man or woman most apt to create, to invent, and therefore foster civilisation.'

The experts on imagination are the Disney Corporation. They changed the noun into a verb. Disney talk about 'Imagineering' and consider themselves to be imagineers. For Disney this is more a state of mind than a simple recipe to be followed. The imagineers have been responsible for the creation of, and ideas behind, the Disney theme parks. According to Disney's imagineers, to be successful you need to assume that you will be, and avoid being constrained by traditional thought processes. In particular you shouldn't worry about everything fitting together jigsaw fashion early on in your planning, and you must be prepared to challenge every assumption that crosses your path.

**Thinkpak**

A good framework for innovative ways of thinking and assumption-busting can be found in the work of Michael Michalko. His book, 'Cracking Creativity', provides a rich source of approaches to thinking differently and his Thinkpak is a practical tool for getting groups to experiment with their ideas. Thinkpak goes way beyond brainstorming by providing a structure for idea generation and development. The Thinkpak is a pack of 56 cards to support groups based around the SCAMMPERR structure that Michalko has devised for looking at topics from a wide range of different angles. SCAMMPERR is an acronym for the nine principles that Michalko offers for creative work:

- **S**ubstitute something
- **C**ombine it with something else
- **A**dapt something to it
- **M**agnify or add to it
- **M**odify it
- **P**ut it to some other use
- **E**liminate something
- **R**earrange it
- **R**everse it

For example when defining a new facility it's a good idea to start from what you know - say you are designing a new laboratory - and ask what other functions could we use this space for (combine it with something else). Could it also be used as a small cinema in the evenings? What could we take away? For example, some institutions have designed labs that can be easily adapted for use by any of the sciences, rather than design a discipline-specific lab.

The Thinkpak provides a powerful framework for individuals or groups to develop new ideas or new approaches to old ones. As well as the cards themselves, the Thinkpak booklet has a range of initial strategies to prepare for idea generation and selection. The Thinkpak could be a very useful resource, at least at the outset, to break out of old mindsets.
Work Across Domains

One of the commonly known ways of getting some originality into your thinking is to work across knowledge domains. The principles of this commonly held view that great ideas occur at the intersections of current knowledge domains form the basis of Frans Johansson's book 'The Medici Effect'. The idea behind the book is simple:

'When you step into the intersection of fields, disciplines, or cultures, you can combine existing concepts into a large number of new ideas'

Johanssen, 'The Medici Effect'32

If nothing else this gives you a rationale for mixing the membership of your imagineers across stakeholder groups, interests, and know-how, with the aim of mixing ideas to get new ideas.

A useful starting point is to take small mixed groups of staff and students of about 15 members from different areas of the institution and get them to 'vision' what the new facilities might provide. Get them to write their ideas on post-it notes in silence for about 5 minutes and then stick them on a flip-chart. Ask the group to gather to move the ideas around bringing common ones together in groups. This usually takes about 5 to 10 minutes. Having got the groups or themes of ideas ask each member of the group to allocate points to the themes by giving each person 10 points that they can use as they wish.

The top themes can then be taken by smaller sub-groups (3 in each group works well) and given the SCAMMPERR treatment. Even if this only results in confirming what the group thought at the outset it is worth doing for the fun involved but the chances are that it will result in new ideas for what the project should do. For example, in designing a new library or learning centre you might consider how it could be used for teaching or social functions.

Metaphors And Stories

Although much of our transmission of knowledge is through text and print, our history of cultural transmission has largely been through the spoken word. There are two constructs that we have used since humankind first learned to communicate as vehicles for that cultural transmission - metaphor and story. These are powerful tools that you can use to articulate the aspects of your project and to help develop your ideas.

Often, particularly at the outset of a project, we struggle to articulate what our real hopes, aspirations and intentions are - what Lakoff and Johnson describe in 'Metaphors We Live By' as the objectivist myth. This difficulty is exacerbated by our modern western system of thinking that attempts to deal with uncertainty by identifying concrete targets and milestones, often too early in a project when thinking is incomplete. The JISC infoNet approach to project planning emphasises the inherent risks and time wasting that ensues from this approach and advocates the concept of the Sliding Planning Window. At the other extreme we intuitively know what we are trying to achieve but have a deep insecurity coming from our incapacity to articulate and validate our intuition. Metaphor can help us clarify our imperfect ideas:

'Metaphor is one of the most important tools for trying to comprehend partially what cannot be comprehended totally: our feelings, aesthetic experiences, moral practices, and spiritual awareness. These endeavours of the imagination are not devoid of rationality; since they use metaphor, they employ an imaginative rationality.'

Lakoff & Johnson, 'Metaphors We Live By'33

This 'imaginative rationality' based on our imaginative thoughts gives us an alternative to both objectivist and subjectivist points of view that is based on experience. We can take an experiential approach to developing our ideas that encompasses both what we know and what we learn during the course of the project.
'With the experientialist myth, understanding emerges from interaction, from constant negotiation with the environment and other people.'

Lakoff & Johnson, ‘Metaphors We Live By’

We can use metaphor to develop our thinking at the broad level of the project to inform the brief. For example consider the project as journey - a journey with a known direction (at the outset) but perhaps with an unknown destination. We can also use metaphor as a way of understanding components of the project. What is important here is the need to focus not merely on how things will look but how they will work.

By considering a range of other settings such as your building as a factory, garage, hospital, or department store you may gain new insights into its structure, design, and processes. Edinburgh’s Telford College and Glasgow Caledonian University both used this method for their new build projects.

Telford College had its Hub designed by people who specialised in designing catering outlets in shopping malls. Glasgow Caledonian has used metaphors within its interior design for the Saltire Centre the ground floor being a city and market place, the first floor which has 3 entrances and exits being an airport departure lounge and other quieter floors using domestic garden and living room metaphors. We should also think about making the metaphor a reality in as many interesting and engaging ways as possible. One underused ambient factor is sound; for example, to strengthen the metaphors used in the Saltire Centre at Glasgow Caledonian sounds are used at the entrance to each area to give clues to users about the nature of the space - as you enter the quiet living room on the top floor of the building a voice above your head quietly says - Ssssshh.

The University of Sussex InQbate CETL is developing innovative teaching and learning in creativity. In generating ideas they looked at performance space. The model for the space design was a combination between the black box model of the theatre and the white cube model of a gallery to create a white box which gave flexibility and visual impact. They also drew on the idea of a magician’s cabinet, with walls that moved in unpredictable ways and changing colours to try and make it an exciting place that fascinates people.

Biology has much to offer in the understanding of systems and processes that may support innovative thinking about your building. ‘It’s Alive’ by Christopher Meyer & Stan Davis covers ideas on the convergence of information technology, biology, and business and Brand’s book ‘How Buildings Learn’ touches on concepts of evolution and natural selection in the context of buildings - those perfectly formed and incapable of adapting, for example, are unlikely to survive for long.

Stories are vehicles for combining metaphors (and analogies) that you develop into engaging descriptions of the project and how it will work. It is worth considering, for example, writing a ‘day in the life’ account for each type of user of your new building that shows how they will make use of it.

Cultural Probes

In the Implementation section (under Working With Others: Communication), we suggest a range of possible ways of promoting and engaging people in the project as it develops.Whilst many of the strategies for engagement and collecting ideas are likely to produce good ideas you should also consider soliciting feedback from stakeholders in more imaginative ways - for example by issuing a small number of disposable cameras and asking them to take photos of things on campus that interest them or get them excited. Glasgow Caledonian University used this approach when planning the fit out of the Saltire Centre and got useful subliminal information, on seating preferences for example, from the photos that were taken by students using the current resources such as the learning café.

If you have the time and resources you should also make extensive behavioural observations of the way in which current resources and facilities are used. This is not only useful to inform the project but it enables any post-project evaluation, by using similar observational techniques, to include the study of some of the softer cultural impacts of the new facilities.
A tool worth considering to improve your understanding of the softer cultural impact of the project is social network analysis which, by comparing the diversity of pre- and post-project human interactions, can show who is talking to whom and whether the complexity and extent of interactions has increased - often a good indicator of the extent of creativity (see the Medici Effect). 

Pace Layering

What might education be like 10,000 years from now? That’s the sort of question that would interest those involved in the Long Now Foundation. Founded in 1996, the Long Now Foundation was established to foster long-term responsibility. As someone involved in an educational building project, long-term responsibility has to be part of what you think about. It may not be that ‘what might education be like in 10,000 years’ time’ is a direct concern in your project but 30 years or 50 years from now the products of the project may well still be in use. Imagining how education might have changed even in the relatively short time of 50 years is hard. It’s hard because we don’t know - if you think of the period between 1990 and 1995 and the impact that technology, and the web in particular, has had on society and in its turn on education in that period of time we could not have predicted it. Even Berners-Lee, credited with the invention of the web, couldn’t have predicted what would happen with it. As we mentioned in the introduction to this infoKit the only safe thing to do is to make sure that the future is not disabled by what we do today. But how do we balance that uncertainty of rapid change, largely fuelled by technology and our long-term responsibility?

In the ‘Clock of the Long Now’ Stewart Brand talks about the presence of fast and slow components in systems. For example he describes a coniferous forest as a spectrum of scale from pine needle, to tree crown, patch, stand, whole forest, and biome. These components are both scaled in terms of size but, more importantly, in terms of time from the eternity of the biome through the decades of the patch to a short lifetime of a year or less for the pine needle. This idea is developed, by Brand, into a series of ‘layers’ for civilisation itself:

- Fashion/art
- Commerce
- Infrastructure
- Governance
- Culture
- Nature

This is not a hierarchy but each layer has its own value, and speed of change. The layers interact at their interfaces and operate at their own ‘pace’ from fashion/art which is busy, fast, constantly changing through to nature which is enduring. Brand developed this simple idea in his book ‘How Buildings Learn’ with buildings having the pace layers below:
The concept of pace layering (Brand 1994, Morville 2005) sees a building as a series of layers that have differing life spans. The site itself has an eternal life, whereas the building structure might last 50 to 100 years. Other layers such as the external cladding of the building or the interior walls might have a life of 20 years with internal design, decoration and furniture lasting for 5 to 10 years. In a rapidly moving world it makes sense to locate the capacity for change in those items with the potential shortest life span and avoid, if possible, creating some layers, such as internal dividing walls, that have a medium term life span and are a potential barrier to accommodating changing activities.

A key theme coming from our uncertainty about the future, and also clearly suggested by the Building Schools for the Future programme and the documents from the Organisation for Economic Co-operation and Development (OECD), is flexibility in building design. Pace layering helps us to think clearly about where we can locate flexibility.

Thinking about what is enduring in your building and what will be changed in a relatively short time scale is an essential part of ensuring long term useful life for the building. Clearly, open flexible space keeps options open but there may be a need for temporary structures that play to human concerns about privacy, noise, and the range of activities possible in such open environments. Pace layering can also help when considering factors that influence behaviour such as graphics, colour, signage, lighting and sound.

**Scenario Planning**

**Further Resources**

We have an infoKit on Scenario Planning available as part of our 'Tools and Techniques' range.

- [Tools & Techniques: Scenario Planning](#)

Scenarios are stories of alternative futures and are an excellent method of helping you decide what type of spaces you require for the many different types of teaching and learning activities that take place within your institution, and to meet the needs of your learners and staff. You need to use your imagination here otherwise your new spaces will look and operate just like your old spaces - 'Some people think that the future is just like the past - but bent a little!' Peter Day.

It is impossible to predict the future, but based upon what we know today, scenarios can help paint plausible possibilities for the future.
The diagram below is based upon the Edinburgh Scenarios - four global perspectives that could inform the future of e-learning which were developed by an international panel. You can use these scenarios to inform the learning space scenarios for your institution.

**Scenario Planning | The Edinburgh Scenarios**

- **Virtually Vanilla**
  - Learners enjoy ubiquitous access to content
  - Rich provision of content
  - Directed and controlled
  - Institutional requirements prevail
- **Establishment, Convention**
  - Learner experiences
  - More predictable
  - Less technology-focused
  - Less innovative
  - Cost-cutting route
  - Traditional models of teaching
  - Invest in new classroom but less in infrastructure
- **Web of Confidence**
  - Professional teachers
  - Learners empowered to control own learning
  - Learners confident about technical skills
  - Innovative learning experiences
  - Creativity and innovation encouraged
  - Risk-taking encouraged
- **Self-organising, Emergent**
  - Learners opt out
  - Reliance more on popular community groups
  - Emphasis on informal, unstructured learning
  - Cut back on e-learning and technology
  - Poor learning design
- **Technology Frustrates**
- **Back to the Future**
- **You Choose**

For each scenario, examples exist that exemplify at least some part of the philosophy. These scenarios exemplify the diversity of potential educational futures - they offer different educational visions (individualised, community-based, vocational), diverse uses of digital technologies.
None of them are necessarily 'right' but they offer conceptual tools for exploring how to 'reinvent' schooling to meet the needs, desires and aspirations of diverse communities.

What kinds of 'What if ...' questions may be pertinent to the kinds of learners and communities you work with?

**Space To Place**

'Quality of place can be summed up as an interrelated set of dynamic, participatory experiences.'

Richard Florida, 'The Rise of the Creative Class'

In his work on the creative class, Richard Florida identifies some key characteristics of places that come to have real meaning in people's lives. He describes a quality of place that is a million miles away from the soulless education buildings that we have all experienced that could be in any institution anywhere in the world. The factors that make a venue have 'quality' of place are:

- what's there
- who's there
- what's going on

'People in my interviews and focus groups often define 'authenticity' as the opposite of generic. They equate authentic with being 'real', as in a place that has real buildings, real people, real history. An authentic place offers unique and original experiences'

Richard Florida, 'The Rise of the Creative Class'

Florida also identifies the key features of these spaces as being authentic, different, and experiential. Such experiential places of quality have been described by a number of authors as 'Third Places'. For Florida, based on previous ideas from Oldenburg, this means 'social spaces'.

'Third places are neither home nor work - the 'first two' places - but venues like coffee shops, bookstores and cafes in which we find less formal acquaintances. These comprise 'the heart of a community's social vitality' where people go for good company and lively conversation'

Richard Florida, 'The Rise of the Creative Class'

This theme is developed by Christian Mikunda in his work on Third Places in the retail industry that are used primarily not just as venues but also as tools for marketing the company or its products. In Mikunda's view:

'Third places are 'experience worlds' with common characteristics:

- They are landmarks
- They are designed for movement/malling or strolling
- They have concept lines
- They have a core attraction'

After using some of these methods to stimulate your ways of thinking and to develop your ideas, you could move on to produce some Concept Sketches. These are often worked on jointly with your architect and interior designer and are the physical embodiment of your vision. Newham College has used this technique.
These trends in the design and development of engaging, experiential places inevitably have repercussions for post school education where one of our key aims is not just to attract students but to retain them and to ensure that when they seek further educational development our institution is the one that they choose. At the heart of this phenomenon is the need to stop thinking about creating spaces and to create PLACES.

**Imagining Future Processes**

Before launching into a refurbishment or new build project it is worth taking a step back to give consideration to what it is you hope to achieve in the new space. Is it really just a replica of what happens in your current space or are there things that could be improved about the way your organisation currently works?

‘Business processes are wrapped around everything’

Michael Turpie, Telford College

There are a number of examples within the education sector of organisations that have reviewed their processes as an initial part of their Learning Space Design Project. JISC infoNet has produced an infoKit on [Process Review](#) that gives some simple fast-track ways of identifying improvements and emphasises the need to put the learner at the heart of the process. Elsewhere in this infoKit we refer to the need to have a creative view of the future that you wish to create. This has to be a starting point for process review. Having a view of what you would like things to be like means that during process review you can measure proposals against that future rather than adopt a ‘deficit’ approach that tries to ‘fix’ what is perceived to be wrong, which can be threatening and insulting to staff that operate current processes. For example, a rationale that is business process-focused, such as that used by Telford College, provides a common focus for staff and managers to make improvements.

Telford has introduced a managed Just-in-Time printing service for staff in its new building. This has resulted in storage space and financial savings. Michael Turpie, Associate Principal at Telford, endorses the need to plan, to be organised, and to think through the cycle. As a result of the initiative throughput has increased by 50%. There is an electronic document management system in place at Telford and the Corporate Information project completely changed information systems in the College. Electronic signatures, ID management, workflow, etc are all built into it and the information is more accurate than before and flows well.

At Glasgow Caledonian, the Students Access to Services (SAS) project undertook process review as an extended project over more than two years that involved all the departments providing services for students. The starting point for this review was a simple underlying principle that 'students should not have to understand how the university is structured in order to access its services'. The University engaged a project manager and used external services to review what was done and how it was done. A key aim was to identify which processes were:

* information provision*
transactions

deep processes involving problem identification and solution

The first two, information provision and transactions were, as far as possible, taken on line and are delivered in the Saltire Centre through all the computers in the building but also specifically through the Arup kiosks (interactive information points).

Feedback from the University was that an important phase of the SAS project was the input from JISC infoNet, and particularly the application of the administrative principles including 'Do it once, Do it right'. It was reported that these principles were very important, culturally significant, customer service guidelines for staff delivering on the front line. You can find out more about the methodologies used from our Process Review infoKit.

Several organisations have looked long and hard at space issues and identified that small offices can be empty for large amounts of time, paper files may be stored for years without seeing the light of day, and although single offices allow peace and quiet they also work against interaction and serendipitous conversations between staff. Some have come up with some quite radical solutions including; limiting the amount of storage space available to each member of staff, moving them out of one and two person offices into open plan offices and introducing 'hot desking'. At Telford College not even the Principal has an office! Such changes need to be carefully managed but flexible working arrangements and improved staff social areas can help win hearts and minds. Some staff at Telford found the experience of leaving years of junk behind very ‘cathartic’

Technology Push

Technology can also play a significant role in how processes are transacted. For example one aim in the case of Glasgow Caledonian was 'to make the best use of staff and technology' by making information and transaction services available on a self-service basis. In addition to improving current services, technology can often facilitate new ones, for example, Newcastle College believes the introduction of VOIP has not only provided cost savings (by only having one set of cabling), it has also encouraged them to provide a more efficient service by introducing a 'Call Centre'. This has been particularly useful in dealing with high volumes of sickness reporting calls. The Call Centre also deals with calls from a range of other colleges partnering with Newcastle to deliver Work-Based Learning.

The development of an integrated IT infrastructure, such as that at Newcastle College, is an essential pre-requisite for developments such as the centralisation of admissions processes, the provision of self-service information and transaction facilities, integrated buildings management, and personal development planning schemes that are integrated with other information systems. Moving from a September peak to year-round interviewing allows more time to discuss the suitability of programmes of study and ensure that special needs are identified and supported.

Some of the techniques that are used to stimulate new ideas, as described in Techniques To Aid Imagination, can be used when you are considering your processes; the SCAMMPERR technique may be particularly relevant.

Developing The PESTLE Framework

You may be familiar with the PEST (or STEP) analysis that has been a tool used by managers for a number of years for scanning the environment. This covers Political, Economic, Social and Technological issues. A further development of this framework was PESTLE - adding Legal and Environmental issues for consideration. These frameworks can be used in conjunction with SWOT (Strengths, Weaknesses, Opportunities, Threats) Analysis to produce a benchmark of where you are now and where you want to be heading - further guidance on this is available in our Project Management infoKit.

Subsequent development of this has produced PESTLEV where:

- P is the political environment
- E covers the economy and its effects
• S represents sociological/societal influences
• T is technology
• L is legal (current and impending)
• E environmental considerations
• V relates to the values of the organisation

We would like to suggest a modification to the framework, as this infoKit is about learning spaces, that considers how pedagogical thinking is developing and what future learning scenarios might emerge by adding a second P (for pedagogy) making the framework PESTLEPV.

‘All buildings are predictions. All predictions are wrong. …But buildings can be designed so that it doesn't matter when they're wrong’

Stewart Brand, How Buildings Learn

The issues that arise in considering factors in the PESTLEPV framework will provide valuable information and data to enable the construction of a sound detailed business case for your proposed project. Often the emphasis in business case development is on the financial case, but consideration of the broader areas with the PESTLEPV framework will result in a more robust business case that contains within it environmental, educational, and societal sub-cases and enable the development of targets and performance indicators that go beyond the merely financial. Such broader consideration will also facilitate the emergence of a broader view of project risk and identification of responses to such risks.

Political Influences

Nicholas Negroponte, the former head of the MIT media lab, is currently engaged in a worldwide project to provide a sub-$100 computer enabling as many children as possible to have access to educational technology. As a consequence of this work, he gets to meet many national leaders and always asks them what is their country’s greatest natural resource. Negroponte reports that he has yet to meet a leader that says ‘children’ in response to this question. Clearly what happens to a country's children in their adult lives, how engaged, productive and successful they become has repercussions of the success of the nation. Education is a powerful force for national success, and as such has a political dimension. The resources and facilities provided by a country's educational system have considerable impact. The development of a better education system that is more effective has national importance but is enacted at the local level. The types of spaces that are developed in our schools, colleges and universities will have an impact on the achievement of high level national aspirations but must also reflect that view of the future held locally. At Glasgow Caledonian, for example, the Saltire Centre focuses on work done by students outside the classroom and aims to enable their development as self-actuated lifelong learners.

Many further education colleges have developed excellent working relationships with their local communities and these are taken into account when considering a new build or refurbishment project. For example, training restaurants and beauty salons in Newcastle College’s Sandyford Campus were frequented by local people and when considering moving these facilities to the new build, they were concerned that their ‘regulars’ would not move with them (happily this is not the case). Encouraging the local community to use college resources such as the library was important to John Wheatley College.

Economic Factors

Some funding streams that are often underexploited are:

Alumni
Fundraising from charitable trusts
Corporate gifts particularly of technology
Lottery
National Endowment for Science, Technology and the Arts (Nesta)
Learning space developments and educational buildings in general are receiving high levels of funding at the moment (as explored in the Anticipation section). However, this is often in the form of one-off capital costs for basic provision. Funding the rapidly changing layers shown in the Pace Layering section, environmental sustainability or the graphics and high quality furniture that is the ‘icing on the cake’ is often difficult.

At Glasgow Caledonian University, external grants enabled the purchase of compact rolling shelving stacks that enabled the more efficient storage of books and therefore provided more space for learners in the Saltire Centre. The University also received a grant from the Scottish Arts Council to provide two public works of art; one inside the building and one outside. The external lighting for the Saltire Centre was also partly funded by a grant from Glasgow City Council. John Wheatley College, also in Glasgow, was very successful at obtaining a range of grants to support developments on its East End Campus around the theme of sustainability. There is an important message in these examples; you need to identify clearly what you may need grants for and why these aspects of the project are important and then identify sources that will be sympathetic to both that aspect of your project and your reasons for wanting to implement it.

Sociological and Societal Issues

We are witnessing some key changes in attitude and aspiration in our students. They are increasingly regarded as 'customers', particularly following the introduction of tuition fees in England, although this is somewhat 'distasteful' terminology to many employed in the education sector. However, recent nationally-reported complaints from some student groups on matters such as perceived reductions in lecture and tutorial time indicate that the shift goes beyond student as customer to students as consumers of higher education services. As this trend continues it becomes increasingly important to know and understand 21st century students.

Many are the YouTube generation who have lived their lives in the presence of ubiquitous highly capable technologies and internet connectivity. According to Prensky they will have spent 10,000 hours using video games, dealt with 200,000 emails, had 20,000 hours watching TV, and used a mobile phone for over 10,000 hours before the age of 21. Whilst it is difficult to verify the truth in these figures, it is clear that these students get their information, conversations and stimuli in a very different way from those of the early 1990s. There are clearly issues here that need to be considered concerning technology availability in new facilities, modes of communication and social interaction.

Social interaction, in particular, is an important consideration in the design and development of learning space. Over the past 30 years, supported by new thinking on technology and its role in learning, the work of Lev Vygotsky has gained wide acceptance producing a growing recognition that group learning and social interaction are at the heart of the learning process. Alongside this, the writings of John Seely Brown (with John Duguid in 'The Social Life of Information') have promoted the importance of conversation as an important tool for learning. How your learning space development project supports the sociality of learning needs careful consideration.

The increasing emphasis on creativity in the curriculum as a key skill to be developed also has implications for the types of learning spaces that we provide. Richard Florida identifies that creative class people, i.e. our connected students engaged in knowledge-intensive learning, value place and community as much (if not more) than their predecessors. This is contrary to our intuitive expectations as IT facilities become ubiquitous.

The message here is clear. Our institutions have social significance to those that experience them. Every institution is different and has a range of social need that only it can know. When planning new spaces and facilities, therefore, the diversity of local needs should be taken into account from the universality of the notion of the sociality of learning itself, as mentioned above, to specific needs such as the extent of on-campus accommodation, creche facilities, types and levels of security, and balance of learning and teaching space.

Technological Factors

It was Alan Kay that said that ‘What people mean by technology is anything that was invented since they were born’. We think of it as leading edge new things or, as Danny Hillis is credited with
pointing out, ‘technology is stuff that doesn’t work yet’. Both quotes are relevant to thinking about technology in the context of buildings. It is natural to want the latest innovative technologies in any new facility but there is always the risk that it might not work, or at least might not work well enough. For example, wireless networking which is now robust and works well delivering bandwidth of 54 Mbits was talked about and available in the early/mid 90s - but installing it as the premier component of the network at that time would have been crazy. It was neither robust nor resilient, had insufficient bandwidth and was hopeless coping with concurrent users.

The important point with technology is that it never stands still. The rate of change of the capability of information technologies is phenomenal which means that the unstable emerging technologies of today will fairly quickly become mainstream robust solutions. If you leave them out of your project it’s likely they’ll make it look and feel outdated almost the instant the building opens.

There are no easy solutions to this dilemma - install all the latest stuff and it’s up to the minute but may not work, don’t install the latest stuff and you’re out of date before you know it. And what's more it's always like this because of the rate of change. The only sensible strategy then is to think 'both and' and not 'either or'. Think hybrid portable/fixed desktop, wired networks/wireless, paper based information/digital information. For learning spaces where success relies on the interface between technology and human behaviour, this has clear advantages. 'Both and' inevitably provides a variety of provision - good because we have a variety of users with a variety of technological experience

(hybrid diagram)

The fact that technology is always in flux introduces some uncertainty when considering what to include in your new building. Firstly it is important to realise, as Peter Drucker identifies, 'The most common source of mistakes in management decisions is the emphasis on finding the right answer rather than the right question'.

It is certain that there will not be a 'right' answer and that the technology decisions are really about a range of answers that are all covered by the solution implemented - for example, wired and wireless for a network solution with certainty in the known reliability and capacity of wired, and growth and flexibility invested in wireless.

Legal Issues

The bad news is that there is a wide range of regulations, permissions, and legal requirements that surround any sizeable building or refurbishment project. The City Lit project involved 47 lawyers from 4 different firms! However there is also good news - universities and colleges have a considerable amount of knowledge and expertise in their professional support departments that can be brought into your project to make sure that you comply with any requirements and they also usually have contracts with solicitors and lawyers to deal specifically with legal issues. Your first step should be to get to know what resources your institution does have that can help you with your project. Below we outline some of the areas that you need to think about and show where you are likely to get help.

Requirements and Sources Of Help

Procurement Regulations
Finance Department
Purchasing Officer
Procureweb http://www.procureweb.ac.uk

Planning Permission and Building Regulations
Estates Department
Health and Safety Statement

Construction (Design and Management) Regulations
Estates Department
Architect
Health and Safety Officer
Health and Safety Executive (HSE) http://www.hse.gov.uk/construction/designers

Freedom Of Information Act

JISC infoNet http://www.jiscinfonet.ac.uk/foi
JISC Legal Advisory Service http://www.jisclegal.ac.uk/
Designated Freedom of Information Officer

Accessibility including Special Educational Needs and Disability Act (SENDA); The Building Regulations including 2002 [Part M Access and Facilities for Disabled People]; Disability Discrimination Act (DDA)

JISC TechDis Advisory Service http://www.techdis.ac.uk/
Centre for Accessible Environments http://www.cae.org.uk/
Design Guidance Document 'Building Sight' issued by the RNIB
Local Authority Access Officer during design
Regional agencies such as Disability North

Environmental Considerations

Under this heading you need to consider both the campus or building in its local setting and issues relating to environmental sustainability including the efficient use of energy, choice of materials (e.g. wood from sustainable sources), use of local and natural resources, siting of buildings and management of the buildings. We have included more guidance on sustainability in the Implementation section of this Kit.

You need to have a clear vision for the role of your campus in the community and issues relating to public access, relationship with other community resources such as shopping and leisure facilities, impact on local residents of increased student accommodation or extended opening hours. You also need to consider the relationship with other buildings nearby. In an urban setting this may involve analysis of how your development will affect their access to light (City Lit was involved in a long running dispute about ‘Rights of Light’ that cost them £0.5 million in compensation). There may be historic or listed buildings on campus or nearby and/or significant archaeological remains on the site you intend to develop.

"'Daylighting', natural materials and other green features also help to create the stunning buildings and campuses that contribute to student and staff recruitment'".

Peter James27

Similarly you will have to think about Sites of Special Scientific Interest (SSIs), tree protection orders or any significant environmental features on site. Making the conservation of such features an aspect of the design may generate funding opportunities. There is also a need to identify any mining or industrial activity that could pose a potential hazard in terms of subsidence or pollution. Consideration
of light and noise levels within the spaces also comes under this heading. Bilborough College used the Schools Standard BB93 for their development as noise was recognised as a major factor. Some summary information on this standard can be found at University of Exeter's Centre for Energy and the Environment. The Commission for Architecture and the Built Environment (CABE), ‘Design with Distinction: The value of good building design in Higher Education’, reported that high noise levels can have negative influences on the feeling and behaviour of staff and students.

If you have a green policy that includes reducing the number of cars parked on the site then there could be a risk that there may be fewer student applications if no car parking is available for them. The policy could also have an effect on the local community in that staff and students may start parking in the street around your institution. To minimise this risk, you may need to have discussions with your local authority and bus/coach companies to ensure that there are adequate public transport links. If some staff have to travel between campuses then you could consider having a small pool of environmentally friendly cars so that staff do not have to use their own.

**Pedagogical Issues**

This is where you consider how your plans relate to your teaching and learning strategy. Further discussion on this can be found in the *Anticipation: What Are Learners Doing?* section. In our resource collection, a selection of case studies and photo library show how different pedagogic approaches are exemplified in building designs.

**Case Studies**

- [Durham University](#)
- [University of Sussex](#)
- [Northumbria University](#)
- [Glasgow Caledonian University](#)
- [Edinburgh's Telford College](#)

The University of Strathclyde, like many others, still relies heavily on traditional lectures but has adapted a lecture theatre so students can turn round and use PCs so that practical aspects of the subject can be better integrated than when lectures and practicals are delivered separately. Similarly it has banana-shaped desks in traditional seminar rooms to encourage collaboration and conversational learning. You can view these in our Virtual Tour within the resource collection.

The Department of Computer Science at Durham University promotes active learning via the design of its Techno-Café. Groups of students work in booths with a central table, laptops and tablet PCs and a large 48-inch plasma screen which each of the students can tap into their facility so that they can demonstrate to the rest of the group what progress they have made, what they are doing and they can collaborate on documents etc.
The University of Sussex stimulates creativity by using its InQbate space as an ever changing space in which flexible partitions, mood lighting and extensive audio visual equipment create a stimulating interactive environment. The idea of integration across learning spaces is also important to some organisations. We can see examples of integrated approaches at Northumbria University library which has been refurbished to provide more flexible places that cater for individual or group learning but are still adjacent to reference material and learner support services; in the Glasgow Caledonian University Saltire Centre where library and social space meet and at Telford College where break-out spaces are sited right outside classrooms.

‘Instead of thinking of school settings as places for moving through to get from one activity setting to another, these environments need to be understood as places where the entire system supports knowledge and action so that learning extends across and between settings’

Lippman, Practice Theory, and the Design of Learning Environments

Values Of The Organisation

The values of your organisation, usually stated as part of the mission statement, are a key driver in the planning and designing of technology-rich learning spaces. A few examples taken at random from college and university values statements illustrate how some of them are directly related to this topic.

University of Northampton

Enhancing the economic, social, cultural and creative life of the local and regional community

Providing a safe, supportive environment for students, staff, partners and visitors

The Robert Gordon University

The University aspires to provide a working and learning environment built upon discovery, passion and inspiration

Oxford Brookes University

Social responsibility - ensuring the understanding and care of people and stewardship of environmental and public resources

Bradford University

Application, innovation and partnership providing a stimulating, healthy and safe environment in which to learn and work

Achieving sustainable development

Bristol University

We aim to care for the environment and the communities within which we operate

City College Plymouth

Learners first: the needs of our students come first and every learner will be provided with opportunities to achieve their full potential within a safe, stimulating and supportive environment

Effectiveness: we are professionally and financially sound, effective and efficient with a commitment to protecting the environment in a sustainable manner

A key value that you may wish to consider is that of respect. Evidence from a range of colleges in otherwise deprived environments has shown that giving learners top quality spaces engenders a
sense of ownership, pride and respect. Anecdotal evidence from colleges such as Matthew Boulton, Telford, and John Wheatley suggest that vandalism is rare in these environments - a claim certainly borne out when we visited.

Reality Check!

Related Resources

- Change Management
- Influencing Others
- Handling Conflict

Having tried to be innovative and creative about developing the vision for a new learning space it is time to do a series of reality checks on the design ideas you have come up with. The checks range from consideration of high level issues that may be show-stoppers for your project to detailed pragmatic considerations that can affect the usability of individual spaces. It pays to involve a number of people at this stage particularly people who will be carrying out their day-to-day activities in the spaces concerned although you, and they, may sometimes have a tricky time separating genuine obstacles from fears about change. In our section on Influencing Others: Handling Conflict in the Change Management infoKit we discuss the fact that people often tend to exhibit a tendency to be either a Matcher or a Mismatcher. Matchers seek similarities and tend to agree easily. Mismatchers look for differences and tend to be good at testing/prooﬁng/checking out what will stop something working. Matchers may support change but are unlikely to instigate it. Some people who appear excessively critical of what you are trying to achieve may simply be exhibiting mismatcher tendencies. These people can be very useful in terms of helping you to pinpoint risk and test possible solutions and because they like to challenge they can often be effective change agents once you have them on board.

The only magic formula for this stage of the work is common sense. Some of our suggestions may seem to state the obvious but it’s amazing what can be overlooked in the excitement of a new build project and some of our tips reﬂect mistakes that others have already made.

General Design

This is not meant to be a comprehensive list of considerations - your architect and other specialist advisers should have already asked you all the right questions but here are one or two prompts about issues that might require a little local knowledge:

- Does the overall design ﬁt its surroundings and comply with any stipulations in outline planning consent?
- Does the design take full account of the layout of the site and any issues such as seasonal flooding/erosion etc?
- Are initial surveys still valid in the light of the final design? John Wheatley College had to undertake further geotechnical surveys once the building footprint was known.
- Does the layout of the site take account of all access considerations including pedestrian, bicycle, public transport, parking?
- Does the design take account of cleaning, maintenance and waste disposal considerations e.g. is it possible to clean the windows without blocking access routes?
- Have you considered the functions going on in each part of the building relative to one another in relation to considerations of noise, health and safety hazards, special security requirements etc?
- Have you considered the functions going on in each part of the building relative to one another in relation to sight-lines and issues of privacy and security?
- Have you considered the design in relation to your Business Continuity/Disaster Recovery plan to identify issues and/or opportunities?
- Have you thought enough about future changes? There may be a need to review your plans particularly where planning or other issues have caused a delay to the project e.g. a college planning to build a photographic darkroom found that the digital revolution overtook them whilst they were involved in a planning dispute.
Technical Infrastructure

This is an area where you would not necessarily expect architects and builders to have a lot of specialist knowledge so you will need to ensure that you involve suitably qualified professionals in your reality check. You might start by asking:

- Have you considered the location and capacity of power sources?
- Do you know the location and precise route of other mains services?
- Do you know where your nearest JANET connection is situated?
- Have you looked at the length of cable runs?
- Have you considered the location of server rooms e.g. to ensure you haven't sited one beneath a water tank?
- Have you considered the ventilation/cooling requirements of server rooms and any other rooms with specialist machinery?
- Do you know the details of rack sizes etc to ensure that the equipment will fit into the planned space?
- Has there been adequate liaison between technical and IT suppliers and your own technical or IT staff to ensure that new equipment is compatible with existing services/infrastructure?
- Have you checked sight lines in relation to all static audio-visual equipment in teaching rooms?
- Can you get a mobile phone signal where necessary such as in reception and social/collaborative areas?
- Will printing/copying or other equipment cause noise in open plan areas?
- Have you fully considered all accessibility issues e.g. does the estimated ‘footprint’ allow for larger screens/keyboard/wheelchair access where necessary?
- Have you thought about all the spaces people might use as learning spaces e.g. are garden areas and study bedrooms wifi enabled?
- Is it clear what source is funding the cost of new and replacement equipment e.g. the project, institutional or local budget?
- Have you taken all possible steps to facilitate flexibility such as using raised floors so that services can be moved as necessary?
- Are you confident you understand the ongoing costs associated with the technology?
- Have you thought about replacement cycles and the scheduling of upgrades/replacement?

Individual Spaces

The devil, in any project, is usually in the detail. Sometimes the most architecturally stunning buildings can suffer from a lack of understanding about how the space is actually to be used. As one colleague from the sector put it, ‘Architects see it as their building. They want to win awards but you have to live in it.’ Having said that, a stimulating space will itself generate ideas about new ways of learning and working so we need to be wary of focusing too heavily on the way we do things now. The following prompts may hopefully alert you to some potential problems without stifling your desire to be creative and innovate. You may also want to look at the section giving Guidance on Using Space Data Sheets to ensure you have captured all requirements fully and in a way that can be accurately costed.

- Have you considered the location of any specialist, heavy, bulky equipment and ensured that it can be installed at the appropriate time?
- Are the lifts large enough to permit the movement of bulky items in future?
- Have you considered seasonal variations in relation to the processes carried out in the space? Will the space be used for occasional high volume activities such as enrolment or examinations and what are the implications of this?
- Will a space ideal for summer usage have suitable places to hang heavy coats and store wet umbrellas?
- Is there adequate secure storage for staff and student personal belongings?
- Have you looked at open access areas in relation to Data Protection considerations? This may be a particular issue where staff and students are using the same space.
- Have you looked at flexible spaces in relation to health and safety considerations particularly where users may rearrange furniture? You need to think about the risks involved in physically
moving furniture, the possibility that new configurations could block access to exits or essential services and the risks of trailing power cables etc.

- Atrium areas, mezzanine floors and open walkways all help create a sense of height and space - have you looked at these spaces in relation to health and safety considerations particularly in relation to objects falling from one level to another? You could perhaps ensure that rails on balconies are shaped to prevent people placing objects on the edge.
- New spaces frequently attract usage levels in excess of those anticipated - can cleaning and related services cope with peaks in usage?
- Can cafeteria areas cope with peaks in usage without queuing and congestion?
- Have you considered circulation around the space at peak times such as when large numbers of students are moving from one class to another to identify potential bottlenecks?
- Have you considered the relationship of fixed seating to heating and ventilation outlets to ensure users are not seated in draughts or too close to heat sources?
- Assuming a no smoking policy in the building where will smokers congregate and will this result in issues relating to access and litter?
- How will you manage noise levels where open access and flexible areas are sited in close proximity to areas where formal teaching is going on?
- Have you thought about signage particularly in large, open plan spaces or zoned spaces to help users use the space and locate services effectively?
- Have you thought about the costs and potential difficulty of changing signs as the building use develops?
- Where staffed 'help points' are available in student areas will the staff have access to all of the equipment they need to deal with queries effectively?
- Have you thought about how you can ensure that staffing levels can respond to demand?
- Finally have you thought enough about future changes or have you concentrated too much on how things are at present?

Value Engineering

One last reality check, having considered all of the issues above, is how has any of this changed your design/specifications and is your budget and timescale still realistic in the light of any changes? You may find it helpful to consider your plans from a Value Engineering perspective. Value Engineering is a technique commonly used in manufacturing to 'optimise the relationship' between Function and Cost. This is of course a euphemism for cutting cost but many of the approaches do make sense. In relation to building design you might think about:

- Material substitutions - Can any of the intended materials be replaced by less expensive ones that function just as well? Going back to the concept of Pace Layering if a certain aspect of the design has a life span of ten years, then using a material that lasts thirty years is wasteful.
- Features - Have you built in more features than users want or will actually use? This may be difficult to judge when you are trying to do things differently.
- Energy efficiency - Are there opportunities to make the design (or the processes carried out in the space) more energy efficient? This is discussed further in the section on Sustainability.

Case Studies

- Edinburgh's Telford College
- New College Durham
- Matthew Boulton College

An example of a Value Engineering type approach is the decision by Telford College to leave certain stairwells and corridors unpainted and to make the bare concrete a feature of the design. This decision was taken to reduce maintenance costs since unpainted walls don't need repainting. It was also felt that the design would encourage students to circulate more quickly through these areas and hence discourage the vandalism that might occur if people were to linger in such zones.
A similar approach, though they describe it simply as good project management, was adopted at Matthew Boulton College. The Principal refused to accept global figures for the fit-out of certain areas and insisted on a detailed breakdown of material costs. This required considerable persistence in the face of claims that 'we don't work that way' but the end result was that considerable savings were made on items as basic as carpet tiles and door handles. Similarly New College Durham instigated a Value Engineering approach when a 'guaranteed maximum price' estimate came out significantly higher than expected and they believe they got a lot of benefit from this. They challenged aspects such as the architect's choice of exterior cladding and furniture specifications for short stay open access IT areas. In other areas they increased costs to make future savings e.g. spray mixer taps that will save on water bills.

Other examples of so-called Value Engineering may actually be pressured attempts to cut down in some areas in the face of mounting costs elsewhere, for example, reducing sound-proofing around social spaces. As a word of caution there are examples of fabulous new buildings that are fitted out with mediocre and inflexible furniture and fittings.

We recommend you think about this approach early on to identify opportunities for savings. Remember the key word is 'Value' and only you can decide what is most important to your users.

**Implementation**

This is the section of the infoKit where we get our virtual hands dirty. We look at the practicalities of a learning space project from the governance issues and decisions about finances, sustainability and procurement right through to actually managing the project and in particular handling the risks and the change involved. We also look at the range of people involved in such a project, what roles they play and how you might go about working with them.

As you might expect in a very practical section there is a lot of case study material and we have provided a range of templates, worked examples and hints and tips to save you time and effort.

**Moving Forward: Governance**

In the section on *Working With Others* we look at involving stakeholders, and working with professional advisers such as architects to ensure that your project is inspirational, imaginative, creative and practical. You also need to make sure that the project actually happens, is delivered on time and within budget, that the systems and features you want are really possible and will be available when you need them, and that it will all actually work. These 'hard' aspects of the project will be handled by the management structure you establish. At the highest level this will involve having the project as a regular agenda item on the governing body and executive meetings of the organisation.

You need to set up a committee, or group, to take overall responsibility for the planning and delivery of the project. It is likely that this overview steering group will need one or more sub-groups to deal with detailed matters of the building programme, the fit-out, and the operation of the facility on completion.

**Related infoKits**

- [Project Management](#)
- [Risk Management](#)
- [Change Management](#)

You will also need a project methodology to ensure that the stages of the work are documented, progress can be tracked, risks are identified and mitigated against, changes are controlled (so as not to delay or divert the project or raise costs), and that the project is a success. JISC infoNet has developed a Project Management infoKit providing information and templates to help you manage a
We suggest the project needs a dual approach with two parallel sets of meetings - one formal within your management and governance structure and a second that is formally constituted but with a brief to produce and develop the imaginative ideas needed to ensure that the project has high impact. These two sets of meetings have different purposes but should overlap (through some common memberships and sharing of minutes) and interact with one another. This arrangement might look something like this:

Refurbishment Or New Build?

There are a number of issues to consider when making the decision whether to rebuild or refurbish at your particular institution. The decision is not one that can be taken lightly and in either case will involve major capital outlay. Issues that you may need to think about include:

- Is it cost effective to maintain your current estate? You may find that in the long run it is more expensive to stay in your rundown buildings than it is to move into new ones - Edinburgh's Telford College found that it would cost them £3 million more to refurbish its old buildings than to move.
- Many buildings are no longer fit for purpose and maintenance costs are high. The buildings may not be suitable for refurbishment to a standard appropriate to the requirements set.
- Some estates are larger than they need to be, and therefore not as efficient as they could be, and would benefit from downsizing. The disposal of surplus space can be financially attractive if purchased for development.
- The location that you are currently in may no longer be suitable, and it may be advantageous to relocate. Again this may prove financially attractive and enable you to raise funds towards the cost of a new building.

The Learning and Skills Council offers some useful information on the Development Stages in a Property Strategy, including decision-making on maintenance and refurbishment versus rebuilding in its LSC Guidance on College Property Strategies. Whilst aimed at FE much of the information is transferable across the FE and HE sectors.
'The FE estate has been reduced from approximately 9.15 million m$^2$ of floor space to 7.4 million m$^2$ as colleges sell off outmoded, inefficient, poorly located sites in order to develop efficient, flexible and usefully located estates.'

'Building for Skills' LSC Feb 2007

**Options Appraisal/Business Case**

As with all projects you will need to develop a Business Case at an appropriate level of detail.

If you are doing something along the lines of refurbishing a classroom or a single area you may find it useful to look at our resources on developing a Business Case.

**JISC infoNet Guidance**

- Overview Of Business Cases
- Making A Business Case
- Hints & Tips For Developing A Business Case
- Business Cases for Change Management Projects

JISC infoNet has information on Business Cases in its Project Management infoKit and a worked example for implementing an Electronic Document and Records Management System that is easily transferable to a Learning Space Design project context. A Learning Space Design Project can result in some quite major management of change issues and we also have some guidance on developing a Business Case for a change management project.

The JISC-funded Espida project at the University of Glasgow has developed a model that can make Business Cases for 'proposals that may not necessarily offer immediate financial benefit to an organisation, but rather bring benefit in more intangible spheres'.

If you are considering whether to refurbish or rebuild an entire campus or thinking about how to proceed in the light of a merger then you will need to do a full Options Appraisal.

Options Appraisal is a technique for setting objectives, creating and reviewing options and analysing their relative costs and benefits. HM Treasury has produced a comprehensive guide to Options Appraisal in its Green Book and the DfES has a guide entitled Finding the Right Solution that looks at Options Appraisal from a schools perspective and includes some worked examples of a rebuild v refurbishment scenario.

**Financing The Project**

There is currently a lot of money in the sector for developing new learning spaces, as discussed in the Anticipation: What's Going On In The Sector? section of this infoKit, but it is not easy to get the amount needed from one source and projects that are only partially funded are not much better than ones that aren't funded at all! Often a package of funding is needed involving some money from the institution, some from the funding council, and (in the past at least) money from the EU. Increasingly Colleges and Universities are being urged to find ways of raising funds from other sources - these are considered in Imagination: Developing The Vision: Economic Factors.

UK institutions, unlike those in the US, are not very good at raising funds from alumni and charitable organisations. A significant building project is a good opportunity to establish a fundraising arm. If it is successful, it will make the project possible and start a continuing steam of funds for future developments. The Thomas Report on UK University fundraising says that a successful operation should aim to generate five times the investment made in it within five years of operation. This suggests that there is great potential in fundraising if done well but also that you need to start early.

Some things to consider:
- It may pay to engage some consultancy advice to help set up your fundraising operation
- If you haven't got an alumni database start one now
- If you don't know whether you have any alumni who could give large sums then have your alumni database researched by a professional company
- Do some research on the charitable trusts that give to education and target those that seem to match your project aims
- Think about the particular characteristics of your environment as identified in your PESTLEPV analysis. Do any historic or natural features lend themselves as a focus for fundraising? Does your design support agendas of current interest such as sustainability, biodiversity or community access that could gain financial support?
- Start early - individuals and charitable trusts giving substantial amounts like to have helped 'form' the project so involve them while it is still only an idea

**Sustainability**

Sustainability is an attempt to provide the best outcomes for the human and natural environments both now and into the indefinite future and as such is definitely a governance issue. It includes:

'Sustainable development principles must lie at the core of the education system, such that schools, colleges and universities become showcases of sustainable development among the communities that they serve'

DfES Sustainable Development website[^47]

- Integration of environmental, social, human and economic goals in policies and activities
- Equal opportunity and community participation
- Conservation of biodiversity
- A commitment to best practice
- The principle of continuous improvement
- The need for good governance

The DfES has a [sustainable development website](#). Some notable examples of sustainable approaches to campus development exist in Scotland's [Queen Margaret University](#), Lauder College and John Wheatley College. Our [case study](#) on John Wheatley College outlines its intention to be a radical statement of the potential of alternative and carbon-free energy sources in a public building, setting new standards for educational and other public buildings in Scotland.

The [LSC](#), in [Building for Skills](#), has stated that from 2007 to qualify for LSC capital funds all capital projects will need to address the sustainable development agenda by:

- meeting, and preferably exceeding, the requirements of Part L of the Building Regulations
- ensuring that the completed development meets the criteria to achieve excellent Building Research Establishment Environmental Assessment Method (BREEAM) ratings
- maximising the use of natural lighting and ventilation by using wind and solar power to generate light and heat and rainwater to reduce water usage; and
- embedding the principles of sustainability in the design of buildings and building systems

**Going Green**

[HEEPI Green Gown Awards](#)

*Higher Education Environmental Performance Improvement (HEEPI) is a project funded under the HEFCE Leadership, Governance and Management initiative. Part of its work includes identifying and disseminating best practice in energy and environmental management through the annual Green Gown Awards.* Some award winners are listed here:

Geothermal Heating/Cooling
The [University of York](#) saves £11K annually
Photovoltaic cells
**Newcastle University**

Recycling
**University of Leeds**
**Leeds Metropolitan University**

Biomass Boiler
Used at **Queen Margaret University** and **John Wheatley College**, East End Campus.

Photovoltaic cells
**British Photovoltaic Association website**

Roofing
ETFE (Ethylene TetrafluoroEthylene Co-Polymer) is a transparent, recyclable foil used for roofing. It should last for at least 30 years and is anti-static and therefore self-cleaning. It is very strong, transparent to UV light and is not degraded by sunlight. This is the material used for the biomes at **The Eden Project** in Cornwall, England. ETFE has been used in many recent new builds including Telford College Edinburgh, Kingsdale School London and the University of East London.

Royal Holloway College, University of London, has developed 'Green Roofs' on new student accommodation. The roof is planted with species that shield the roof, provide thermal and sound insulation and aid rainwater management. Case study in EAUC 'Biodiversity on Campus' guide - see the section on Practical Management.

Water Recycling
**Queen Margaret University** uses rainwater for toilets - a Sustainable Urban Drainage System (known as a SUDS pond) to capture rainwater and hold onsite rather than contribute to downstream flooding.

Edge Hill University revised its initial SUDS scheme to bring about huge benefits for biodiversity. Case study in The Environmental Association of Universities and Colleges (EAUC) 'Biodiversity on Campus' guide (see the section on Practical Management).

Natural Lighting
‘Natural lighting and ventilation not only eliminate the need for energy consumption, they also help boost productivity and reduce illness and absenteeism related to sick-building syndrome.’ *Build smart for a bright future* by Peter James, THES: Sustainability.27

These principles can be seen in action at **John Wheatley College East End Campus**.

Natural Ventilation
**Santa Clara University**, U.S.A
**Queen Margaret University**
Our Flickr Photo Gallery includes illustrative images from the **University of East London**.

Passive Thermal Design
Naturally heats and cools buildings using solar, high performance windows, insulation and air-tight construction, shading mechanisms to control heat and light from the sun and eliminates the need for air conditioning units.

Our Flickr Photo Gallery includes illustrative images from the **University of East London**.

Solar Heating
Water is heated by solar power at **Kingsmead School**.
ICT And Sustainability

There are sustainability issues to be considered in the technology choices we make. Queen Margaret University has decided to use ‘thin client’ technology whereby PC users do not have hard disk drives at their desks as the hardware and software is stored on a central server. This minimises heat generation and therefore reduces the need for ventilation. Other organisations have gone for flat screen monitors for similar reasons.

The issue of sustainability is also one of ensuring that our spaces remain able to support current models of learning and teaching as they evolve. In the section on Pace Layering we identified technology as one of the most short-lived elements of a building and your vision must take into account a planned replacement cycle for the technology.

Edinburgh's Telford College took the approach of standardising all of its IT equipment when it moved to the new campus (although some of the equipment was purchased prior to the move so that staff could get used to it). There are clear user benefits in having the same equipment in all rooms and the College considered its replacement cycle right from the outset. It estimated the lifespan of the various components as:

- 2 years - laptops
- 3 years - desktop machines
- 4 years - servers
- 5 years - voice and data communications
- 10 years - wiring/infrastructure etc

In planning for financial sustainability the College knows exactly when the spend will occur. All end-user equipment is leased. Servers and infrastructure were initially funded from capital funds although servers will also be leased on renewal. The College has found this to be the most effective option as the leasing company can reclaim VAT which means that they are paying 82-90 pence in the pound over the lifespan of the equipment.

There are numerous logistical issues to be addressed when it is time for replacement. The College has 1,250 items of end-user equipment and the original installation took eight weeks to roll out in the new building. In the live situation there are however only six weeks between the end of one academic year and the beginning of the next. Various options are being considered including rollout at 50% per year over two years or using both the Easter and Summer breaks.

The issue of sustainability also applies to the management of technology. Newcastle College estimates it has saved £45k per annum by introducing an automated system whereby a server powers up PCs in sequence after 7.30am (thus reducing power surges) and turns off every PC at 9pm. Whilst the situation may be more complex to manage in research intensive institutions it is likely that many institutions could make similar savings.

Sustainability: Policy And Guidance

National Initiatives

DfES Sustainable Development website
HEFCE's Sustainability web page
LSC Sustainability Strategy
Presentation on the SFC Approach

Sustainability is high on the agenda of the DfES. The LSC and HEFCE have both published strategies after extensive consultation with the sectors and Scotland also has a Sustainable Development Strategy.

Sources Of Further Advice And Guidance

The Building Research Establishment has developed a new environmental assessment method
(BREEAM) especially for schools. All building projects over a certain size or value funded by DfES must aim to achieve a school's BREEAM 'very good' rating in terms of its environmental performance. This includes Building Schools for the Future, academies and other projects, which are expected to become models of sustainable development.

The Higher Education Environmental Performance Improvement (HEEPI) is a project funded under the HEFCE Leadership, Governance and Management initiative. The project is based at, and led by, the University of Bradford. It provides guidance, case studies and benchmarking tools and coordinates the annual Green Gown Awards. They have also developed an Environmental Virtual Campus where you can click on a character to find out how you can minimise environmental impacts and comply with regulation.

The Centre for Excellence in Leadership (CEL) is creating a new sustainable development strategy to support the development of 'leaders for sustainability' who can lead and promote sustainable development principles in all aspects of their organisation's business and practice, including learning and teaching, staff development, and managing resources.

The Royal Institute of British Architects (RIBA) has web pages on Sustainable Architecture with links to case studies including education buildings. One of the examples given is De Montfort University’s library.

The Environmental Association of Universities and Colleges (EAUC) has produced a guide Biodiversity on Campus which gives practical advice on a range of activities from Making Biodiversity Happen to Management of a Small Coppice Woodland.

The University of Warwick has developed a website for staff and students that details their strategy and gives advice on environmental issues.

The School Buildings Information Centre has a useful website looking at a number of environmental considerations with particular regard to health and safety.

Procurement

Procuring of the supplies and services required for a learning space project will be controlled to some extent, depending on the costs involved, by the official procurement guidelines and policies as set down by UK and European legislation.

Our Applied infoKit on Electronic Document and Records Management Systems (EDRMS) includes a section on the procurement stage. The diagram below is also taken from this Kit but the procurement process is equally applicable to a Learning Space project context.
Office of Government Commerce

**PQQs**

**Sustainability**

**Fair And Ethical Trading**

PQQs are pre-qualification questionnaires which are a tool used to help assess the qualification and experience of suppliers.

**Sustainability** is now a major concern and consequently a sustainable procurement approach is important. The Office of Government Commerce (OGC) website states that, *'The public sector has a key role in furthering sustainable development through its procurement of buildings, goods and services. The Strategy established a business-led Sustainable Procurement Task Force to bring about a step-change in public sector procurement practice, such that by 2009, the UK is recognised as amongst the leaders in sustainable procurement across EU member states'*.48

**Fair and Ethical Trading** is another issue that has come to the fore in recent years and the OGC also has guidance on this. Many organisations within the education sector are now including sustainability and Fair and Ethical Trading in their published Procurement Policies.

**Procurement-Related Links**

Procureweb

Procureweb supports procurement throughout the UK Higher Education Sector and Research Councils.

Main website: [www.procureweb.ac.uk](http://www.procureweb.ac.uk)

They provide a number of related websites, tools and systems including: CuPID - The Central Universities' Purchasing Information Database: [www.cupid.ac.uk](http://www.cupid.ac.uk)
tenders.ac.uk - a tender advertising system where, as a registered institution, you can post tender documentation for suppliers to download and complete: [www.tenders.ac.uk](http://www.tenders.ac.uk)

H.E.L.P (Higher Education Library: Procurement is a comprehensive library of guidance notes on procurement best practice: [help.procureweb.ac.uk](http://help.procureweb.ac.uk/)

Procureweb also includes pages on Environmental and Financial Sustainability and Whole Life Costing and efficiency management.

The Higher Education Partnership for Sustainability (HEPS) Guide on Purchasing for Sustainability is available on the [Forum For The Future website](http://www.forumforthefuture.org/).

Working With Others

'Involve key stakeholders at an early stage and continue dialogue’

Debbie Callaghan, LSC Regional Property Advisor (West Midlands)

When planning and designing technology-rich learning spaces you should talk with as many stakeholder groups as possible and, more importantly, listen to what they have to say. Your list of stakeholders could be very long and so you need to take time to identify suitable people. Some people need to be involved from the earliest ideas stage whereas others will have more to contribute once you have some proposal on which they can comment. We have some resources that may help you in this process.

Useful Resources

- Managing Stakeholder Relationships
- Stakeholder Analysis Template

Creating An MLE:

- Who Should Be Involved?
- Gathering Requirements: Stakeholders
- Adverse Stakeholders
- The Roundtable Approach
- Influencing Others

- Groups to involve are students, staff (of all types), those in the community that the institution works with, non-executives of the institution on the governing body, and indeed anyone who shows a keen interest. It's also good to talk with others outside the institution in as wide a range of occupations as possible. We consider the range of people you may need to engage with in Working With Others.

- JISC infoNet has some generic guidance on managing stakeholder relationships and a Stakeholder Analysis Template to help you analyse the likely perceptions of and influence on your project of various groups.

- The applied infoKit on Creating an MLE has some examples of how to go about deciding who should be involved in an MLE project and starting to gather requirements.

- Not all of your stakeholders will welcome the changes that your project will bring - there may be some adverse stakeholders and our Risk Management infoKit has some guidance on working with this group.

- Involving such a diverse group of people will not be without issues (especially as they will use different vocabularies) and a roundtable approach could be helpful in airing differences in a non-threatening way - we have an example of this approach in the context of implementing a VLE.

- You may need to use all of your influence skills to get some stakeholders on board and JISC infoNet has produced some guidance on Influencing Others.

You do however need to make it clear to stakeholders that consultation does not mean that all their wants have to be included. Indeed the great danger is that the project becomes an amalgam of disparate ideas with no real focus. That is why it is so important to have a strong, clear vision to guide the project and make sure that flexibility is safeguarded.

That's why projects need strong champions that can use ideas to strengthen and modify the vision and prevent it from being derailed. Talk to everyone but make sure that you use what you hear to build on the vision.

'The iron rule of planning is: whatever a client or architect says will happen with a building, won't. Architects always want to control the future. So do clients... The only reliable attitude to take toward
the future is that it is profoundly, structurally, unavoidably perverse. The rest of the iron rule is: whatever you are ready for doesn't happen; whatever you are unready for, does.'

Stewart Brand, How Buildings Learn

'Have a multi-professional approach; get the early support of your ICT department and academic community'

Margaret Weaver, St Martin's College

Communication

Resources

Building A Team

It is often said that there are no new ideas - only old ones that are continually recycled and revamped. There is some truth in this and that is why you need to talk with as wide a range of people as possible. Experience tells us, however, that the majority of stakeholders find it hard to think beyond having more of what they already have. This is not surprising as they have their heads down getting on with their teaching, learning, research or all of these. So you need to choose people who are flexible.

A balance is needed between the current and the future needs and some people you talk with will have great ideas that may appear to be outside the scope of the project. Don't dismiss these - in fact don't dismiss anything - but make sure that all the points made are noted, collated, and considered, these ideas may be just what is needed to provide the right balance between today and tomorrow.

Ways of encouraging ideas include:

- focus groups - you should have a range of these and consider having membership from a number of constituencies rather than single interest
- writing walls that people can contribute to
- postcards that can be sent into the planning group
- web boards and online chat spaces for people to contribute to
- you might also consider using collaborative social software applications for the project - for example something like del.icio.us, a social bookmarking web service giving people a place where they can tag items of interest to the project that are elsewhere on the internet and save the tags for others to use.

Part of your communications strategy should also involve 'telling' stakeholders what is happening. You can do this through:

- open meetings and presentations
- roadshows (particularly useful at key decision points for example when choosing furniture)
- displays of drawings, sketches and plans
- videos and computer-based animations such as walk-throughs of the project
- if you have a model of the building make sure that you put this on display in a variety of locations on campus

You should also consider running some competitions as these are great for getting involvement. These could be about ideas for particular pieces of furniture, ideas for incorporating artwork into the project, or what the name or logo might be. As well as getting a wide range of people actively engaged in the building project such competitions often produce ideas that you can actually use in the building or at the very least use them for publicity about the project.

'The greatest virtue of programming (developing the brief) is that it deeply involves the users of a building and makes it really their building. The great vice of programming is that it over-responds to the immediate needs of the immediate users, leaving future users out of the picture, making the
building all too optimal to the present and maladaptive to the future.'

Stewart Brand

From all of these conversations you will need to draw out the key points that add value to the vision for the project, provide innovative ways of implementing it, and avoid ideas that dilute its impact. Brand again: 'Pei (designer of the MIT Media lab) has said that academia often is a difficult client, and he's right. At MIT the client was at first too vague and later too specific about its needs. Boston architect William Rawn notes that professors are notorious for wanting space designed precisely around their current research, and never mind the future.'

Collecting key requirements from stakeholders to guide the vision and hence the building programme will be an iterative process and time needs to be allowed for this. At this stage you need to ensure that there has been a recent review of existing facilities to enable comparisons during the evaluation of the refurbishment or new build. Whilst gathering requirements, performance indicators can be allocated to ensure that these are not forgotten - this will make evaluation of your new space much easier.

Professional Advisers

'You don't know what questions to ask if you haven't done this before.'

Philip Badman

In a major build you will find yourself working with a range of advisers in professions you may never have come across before. In leading the build at City Lit the Vice-Principal, Philip Badman, found himself working with 158 individuals from 37 firms. This included 47 lawyers from 4 different firms, all specialising in different aspects of the law, and specialists such as a party wall surveyor, a rights of light surveyor and archaeologists. Not surprisingly he formed a view on what makes a good adviser:

A good adviser ALWAYS

- thinks of the problems ahead for the client
- identifies, analyses, explains the options
- alerts the client to risks, and mitigation
- confirms scope of services and what is out of scope
- avoids saying 'but you didn't ask that question'
- adheres to strict reporting/instruction regime
- translates for the academics
- sets a realistic project process and timeline
- is patient!

Ensuring that there are good working relationships between you, the client, and all of the professionals involved in the project is crucial to making it really successful. You should make sure that the expectations, roles, responsibilities, and authorities of all the parties involved are clarified at the outset. As well as a matter of detail this is also fundamentally a matter of the 'tone' - good working relationships are essential to the project, as is good communication between everyone involved. Formal communications will be established as part of the governance structure of the project (see the Governance section) but it is also essential to have good informal communications and working relationships to make a project really go well.

'A building project can be a complex process requiring constant monitoring of cost, quality and time. A successful project can only be achieved through communication and co-ordination between the architect, client and builder'

'You and your architect'
Each of the professionals involved in the project brings their own expertise and perspective. You will need to understand the contribution that they can make in order to get the best from them but a key role for your architect is to play a lead role with the professionals involved.

Understanding all of the information provided by a range of specialists can be very difficult but be heartened by a story told by Richard P. Feynman the Nobel prize winning physicist in his book 'The Pleasure of Find

Your Role As Client

In this context we refer to 'you' as the client organisation. The Project Sponsor has overall responsibility for external relationships although aspects of the responsibilities outlined here may be delegated. Good communication, both formal and informal, is a crucial success factor. You should take responsibility throughout the project for ensuring that communication is as good as it possibly can be. The most important part of this communication is developing the brief for the project.

A good quality brief is the most important input to the project and it is your responsibility to develop it. You should use your architect to help you develop the brief as they will be able to provide valuable input to it but, more importantly, they must understand the brief both at the level of detail and vision if they are to come up with the best design solution.

As the architect works with you to turn the brief into sketches that capture the concept, a scheme design and then eventually a detailed design, a series of detailed drawings will emerge such as plans, sections, elevations and perspectives. You need to understand these drawings, which can be very detailed, as you (or the relevant committee on your advice) will have to sign them off. Your architect should also provide sketches and artists impressions and perhaps a computer-generated fly-through of your building to help you.

It is important that you establish at the outset what the fees are for the architectural and all other consultant and professional, such as the quantity surveyor and mechanical and electrical advisers, services and agree these in writing.

It is equally important that you make it clear to the architect whether there is a defined budget for the project, what this amount is, and what it should include. For example, does it include VAT, professional fees and IT equipment? At a relatively early stage you will also need to know the indicative programme for the project as this not only directly affects the resource planning for the project but will also impact on the professional fees.

The Learning Gateway at St Martin's College is based on the assumption that the relationship between the physical environment and the student experience is vital and that the latter can be enhanced if it is designed in right from the start.

The Architect, Raymond Whitaker states: 'To have such a statement within an architectural brief is unusual and to the architect both daunting and exciting at the same time for it acknowledges that a building is not merely a passive box within which activities take place but a structure that can actively affect how the occupants interact. In fact the brief for the Learning Gateway was unusual in many ways for it did not specify the number or size of rooms but instead spoke of interactivity, flexibility, innovation and institutional pride.'

The Architect's Role

The project architect is the key to interpreting your vision, developing the ideas that you have, and transforming it into reality. Architects have the skills to co-ordinate and manage, in conjunction with your internal decision-making mechanisms, the overall building project and to act as your adviser ensuring that others, such as the builder, understand and work to meet your hopes and aspirations. If you do not want the architect to take this lead co-ordinating role then you will need to engage a professional project management company to do so, but usually such project managers do not have the expertise to offer the design co-ordination provided by an architect.
The role of the architect is to turn your vision into a reality. What they can't do is create the vision. You have to be able to articulate what you are trying to achieve with this project. This can be very difficult, especially if you envisage the project changing the way educational activity takes place. The architect will have their view of what education is like, from their own education and other projects that they have been involved in, but they are not educational professionals. You need to ‘paint a broad picture’ of what you want from the finished project and then work with the architect to turn this into a design.

**Co-ordination**

Whatever you do about project management you should regard the architect as a key resource at the centre of the project. You may wish the architect to provide access to a wide range of support professionals such as a quantity surveyor, mechanical and electrical engineers, acoustic and lighting specialists, landscape designers all of which you will need, certainly for major projects, or you may prefer to contract for these services directly. Architectural firms can also often provide interior design services too. Whatever path you choose the architect can act as the lead for co-ordination of these specialist professionals if you need them to.

**Design Solutions**

Using the brief the architect can provide a variety of outline design solutions to be considered and then work with you, on design development, to find the preferred design. Alongside this the architect can liaise with the statutory authorities, which will include planning, to make sure that the necessary permissions are obtained.

**Phasing**

Depending on the size of the project it may be undertaken in several phases. The architect can advise on the best way to phase the project and also determine the overall project timescale. This should lead to the formulation of a plan for the project which contains not just what will be built when but also when each stage tender will be issued, when the procurement will take place, when selection of subcontracted suppliers of elements of the work will be needed, and what the dependencies are from one phase to the next. All of this work will need to come together in a project plan.

**Costing**

As well as knowing the architectural fees you will also need to know the estimated costs for each phase of the project, in order to determine the rate of expenditure, and the overall total cost. Your architect can provide first estimate advice on this. Knowing the overall project budget is very useful to the architect at this stage as there will always be options open to them in the choice of materials and finishes and, although these will not be finalized at this stage, it will be possible to identify affordable options.

**Change Control**

During the building phase there are bound to be changes to the project and you will need to ensure that there is a change control process in place - the architect will have a key role in advising on the authorisation of changes.

In the event of time slippage on the project for whatever reason the architect can advise on reasonable allowances for an extension, taking into account the procurement route being used. Your architect can also advise on overall cost control, especially important, if there is time slippage or changes are made to the project.

**Reporting**

You should also expect the architect to keep in close contact with the project through a series of site visits and attendance at your project meetings.
Quality Control

The architect also has a key role after practical completion of the project in ensuring that 'snagging' takes place and that any faults are remedied to your satisfaction. Snagging traditionally means identifying defects that need fixing at the end of a building project. We would suggest that it makes more sense to work with the builder and architect to make sure that the project meets your expectations at the end. Using this approach snagging can start well before the completion of the building project - this is useful as it can prove difficult and expensive to put things right when the space is completed. An example of the type of issues you may need to address during the project is that work in some areas is not finished to the specification that you and the architect expected. You should work with the builder on providing a solution to the issue. Whilst some problems can be dealt with as and when they arise during the process there are some things that have to be left to a later snagging stage. The Saltire Centre, for example, experienced some leaks through the glass atrium in heavy rain/snow. These leaks could not be detected until changes in the weather highlighted them. By monitoring the project as it progresses you should be able to ensure that the snagging list at the final stages is kept to a minimum.

The Interior Designer's Role

Many projects treat building design and interior design in tandem and let the architect lead on both. It is worth considering whether this is the best way to proceed for your project. There are an increasing number of specialist interior design consultancies that provide services independent of, but in co-ordination with, architects.

Interior designs are often bold statements of intent and clients need some important 'personal qualities' if they are to work well with interior designers:

- Firstly - courage. Sometimes designers propose ideas that seem radical but with good reason. It takes courage to innovate and create inspirational environments.
- For this reason the second attribute - trust - is really important. Often the client can feel that they must control all aspects of the project. It is essential that you are able to trust that your designer is acting in your best interests and those of your customers.
- Thirdly, often linked to trust, is faith. The design process can take a long time and the building process can be messy. Over this time it is essential for the client to have faith that the end product will actually reflect the original design.
- The fourth attribute - understanding - is about having a mutual understanding that the project is being designed for the user and therefore needs to reflect their culture, their working styles and their tastes.
- Lastly on the essential list, it is important for the client to have awareness. It is surprising how many clients are not fully aware of the contribution interior designers can make. An understanding of the designer's work and profession will help foster faith and trust. By understanding your designer's abilities you will be able to utilise them to the full.

Creative solutions can take a considerable time to emerge so make sure that timescales are realistic!

Tony Coffield, Head Of Interiors, The Curious Group

Choosing Architects and Designers

It is important that you select your architect, and interior designer if you intend to use one, at an early stage in the project so that they can be involved in the dialogue about the vision for, and purpose of, the project. In this way you will get the most out of their skills and they will feel deeply engaged with the project.

Before appointing an individual or practice, do your homework. Architects and designers often have expertise in specialist areas or sectors such as leisure, housing, or education so shop around to make sure you are getting the right sort of experience. It's always good to visit the offices of the practice you are considering employing and advisable that you get to see a portfolio of previously completed
projects. If possible, follow this up with a visit to some of the projects in person and speak to the staff that have worked with the architect or designer. Getting a first-hand account from a client can be the best way to judge how a practice operates.

Good working relationships, and mutual understanding, are vital to a successful project. These can only be developed over time so it is really useful to make sure that clear stages are agreed that are linked to payment. Stages also help allowing you, the client, to have input at designated intervals throughout the project. If managed well, you should feel like you are part of the design team, and that your ideas and suggestions are incorporated and interpreted by the professionals involved. If this close working relationship does not emerge then you may need to revisit the composition of the team.

Other Professionals

'Recognise the importance and value of consultancy support'.

Debbie Callaghan, LSC Regional Property Advisor (West Midlands) 49

Architects and interior designers are not the only professional support you are likely to need. You can see an extensive list of potential advisers in our consideration of stakeholders in the Working With Others section. Here are a few common roles you may not be entirely familiar with:

- **Mechanical and Electrical Engineer.** One of the most difficult aspects of any build or refurbishment is the provision of mechanical and electrical systems and services including IT. Making sure you contract with a high quality mechanical and electrical engineering organisation is a crucial success factor for the implementation of technology-rich spaces. With this type of space it is also advisable to make separate provision for IT systems and services by hiring in this specific expertise. You do not want to risk ending up with a beautiful building in which the IT and electrical systems let you down or cannot be easily adapted to future needs.

- **Project Manager.** Sound project management is essential to ensuring that the project is delivered on time and within budget. You should weigh up the benefits of hiring a project management company to take on this responsibility against the benefits of local knowledge if you have the skills to take this on in-house.

- **Quantity Surveyor.** During the design of the building and its procurement, you need to know whether your cost expectations for the planned features and facilities are realistic. For this you need the professional help of a quantity surveyor. The surveyor should be able to predict whether what you are expecting to get for your money can be achieved and help you to evaluate tenders for each phase of the work to make sure that you are comparing like-with-like when selecting providers. The surveyor may even be able to suggest ways in which you can save money! Provision of external information can be collected in a template such as Space Data Sheets to help with this costing.

- **Acoustician.** An important aspect of learning space is how sound is controlled and managed. You should consider employing an acoustician to help model the noise within the space you are planning and to advise on floor, ceiling and wall finishes that can deliver a suitable soundscape for the space.

- **Lighting Consultant.** Similarly lighting in learning spaces is a crucial factor. You should obtain the advice of a lighting consultant in order to ensure that the space has the flexibility to provide good lighting throughout a daily, weekly and annual cycle.

- **Artists.** Artwork can help to provide a stimulating environment and is increasingly being used in learning spaces to add an inspirational element to the space. You should consider using one of the specialist agencies that can introduce you to a range of artists and help you select and procure artwork appropriate for the space.

- **'Intelligent Client'.** This is already a long list and there may be other specialist needs particular to your type of project. A concern in dealing with so many professionals is not only how to ensure client needs are understood but also how to ensure what is intended actually gets done (or when things are not getting done as intended what questions need to be asked). You can employ professional help to act on your behalf as an interface between all, or any, of the professionals that you need to work with and with the builders. Such help acts as an 'Intelligent Client', that is they act intelligently on your behalf bringing in professional knowledge that you do not possess. They are an interface between you and the supplier.
Expectations Of You

We spoke with an architect and an interior designer and asked them to say what was essential, what was desirable and what to avoid in the client relationship from their viewpoint.

What will the Architect expect of you? Colin Allan, Building Design Partnership

'It is essential from the outset [for the architect] to work with the client to determine their vision for the project. This in reality usually means working with a core group of decision makers within the client organization who each know their defined roles and responsibilities. The need for a well thought through business case and brief is very important and cannot be overestimated. These need to be refined by regular dialogue both informally and in formal meetings. It is important to have a sense of urgency - in order to maintain project momentum. Realistic funding particularly if the brief is ambitious is vital. We don't do miracles!'

'It is clearly desirable in projects in universities and colleges for the architect to have access to all key stakeholders and to have a continuing relationship with the same client representatives throughout the course of the project.'

'The nightmare things to avoid are unrealistically short timescales as design will be compromised by this and mistakes can be costly. Also to be avoided are a badly defined brief as this leads to time inefficiency and frustration on all sides, and bureaucracy should be minimised at all costs as it gets in the way of progress.'

What will the Interior Designer expect of you? Val Clugston and staff - Nomad-rdc ltd

'It is desirable to have one point of contact with someone within the client organisation. Often the best designs are those where many people have contributed - so many inputs into the design is fine, but too many people with 'sign off' responsibility in the client organisation inevitably leads to disagreements, confusion and delays.'

'Regular meetings are also desirable say fortnightly or weekly meetings with clients and user groups will strengthen the project and help to avoid any details being missed. Regular design meetings are also a way of ensuring that everyone feels that they have a voice. In addition to the meetings the 'single point of contact' in the client organisation needs to be readily accessible. Particularly on large projects the designer needs to be able to talk with the client on an almost daily basis. Of course email makes this process a little easier, but it is important that the designer can contact the client by telephone or face-to-face as often as possible.'

'Over management should be avoided at all costs. Sometimes clients can become too involved. Too much management can lead to misinformation and mistakes are often made. Fear is another thing to avoid - but then we covered that under courage above!'

RIBA's View On Clients

The Royal Institute of British Architects (RIBA) runs an annual competition to find the best 50 clients. These are chosen from submissions by architects. So what are the key characteristics of a good client in RIBA's view?

Characteristics include 'being prepared to take calculated risks - with location, with architects, with buildings, [and] with style.'
In the 2005 list of 50 there are only 5 educational organisations - 'The education sector remains a poor relation, despite its huge building programme...Never mind schools: why aren't universities more interesting?' - is the comment from RIBA in their journal article 'Who dares wins'. A further telling comment on what a good client is, that reflected badly in some of the judgements of the universities included in the top 50 list, concerns the link between the project and its environment or community: 'Everyone [the judges in the competition] agreed on one thing. The best clients have a catalytic role that reaches far beyond the individual buildings'. This aspiration for buildings to contribute to and improve the wider community is an important point to consider in your planning as Richard Florida in his discussion of the concept of 'quality of place' says about universities:

'University and regional leaders in cities like Philadelphia, Providence and even New Hampshire are actively trying to develop such quality of place in and around their universities.'

Richard Florida, Rise of the Creative Class

As educationalists we all know that our organisations have an important role in societal improvement, but rarely do we think about this in the context of our building plans. However what we build, where we build it and what it looks like can have important consequences for who it attracts to the institution and, more importantly, what it says about us to those we wish to attract in the future as they pass by our campuses.

Making It Happen

A major new build or the refurbishment of a whole campus is usually a once-in-a-career type project for the person leading it and it will require all the leader's skill and resourcefulness to keep it on track. In the section on Working With Others we discuss the fact that you will have to get involved with issues far outside your normal remit. Matthew Boulton College had to do land deals with a range of organisations and have a road moved. City Lit was involved in a planning dispute that held them up for 2 years. Edinburgh's Telford College went to a tribunal over VAT and Stephenson College's project was held up for a year while Great Crested Newts reproduced. Despite complexities such as this, people are succeeding in creating stunning new developments on budget. All of those who succeed emphasise the need for a sound Project Management approach.

In this section we look at the practicalities of managing a project that will often have the dual aspects of a physical build and a major change management exercise. The feedback we get about what makes this work is remarkably consistent across the sector and we have drawn on a range of experiences to provide you with guidance, templates, worked examples and practical tips.

It's Now A Project

Resources Available For Project Stages:

Start-Up & Planning

- Business Case Template
- Project Initiation Document
- Stakeholder Analysis Template
- Roles & Responsibilities Template
It is likely that in a major new build you will employ third party project management support. New College Durham allocated £200k of its £30 million budget to this activity. It was a decision that had to be fully justified to the governors and this justification was the comparative cost of getting things wrong! New College Durham did however adopt a hands-on approach and believes much of its success was down to the active involvement of the Principal and Project Sponsor. However good your Project Manager it is nonetheless the case that all staff involved in the project need a threshold level of understanding of project management as a discipline.

There are many ways you can bring staff up to this threshold level and one of the most cost effective is to use the JISC infoNet Project Management infoKit. The infoKit gives an overview of the topic suitable for all staff involved in projects and is regularly updated with more in-depth resources so it can serve as a refresher for more experienced project managers. Most of project management is plain, common sense and a lot of what we describe is simply a structured approach to what you would do instinctively. Many staff may have already carried out many project management activities but view this as simply 'getting things done' whilst recognising that they also rely heavily on luck, perseverance and strength of will. What we are offering is a structured approach and a set of tools that help you to 'get things done better'.

The infoKit offers various tools and templates that you can download and use for your own project. Links to example templates available are highlighted on this page. We have also included some worked examples from a learning spaces context such as the Space Data Sheets needed for this type of project.

Managing The Risks

Resources Available: Risk

Risk Management infoKit
Learning Spaces Example Risk Log
Risk Log Template
Project Controls Database

In creating a new learning space you can't decide not to take risks: that simply isn't an option. You need to be able to make good decisions about which risks to take and how to build in contingency to deal with unplanned events. Risk management is fundamentally about making better decisions and is probably the single most important component of project management.

For this reason JISC infoNet has produced a Risk Management infoKit as a supplement to the Project Management infoKit. This infoKit will help you evaluate your own and your organisational approach to risk and give you some practical suggestions on how to manage the risks you choose to take.
Our approach to risk, particularly in a learning spaces context, is that risk is akin to uncertainty and is not necessarily something going wrong. Things turning out differently to how you expected or planned might not necessarily have an adverse affect on your project. There is always the possibility that risks can be turned into opportunities if managed effectively and our resource looks at both Risk and Opportunity Management.

You will need a Risk Log and our resources include a template for this and a worked example. How you document the risk in relation to its cause and effect will be crucial in determining the appropriate management action and identifying early warning signs. Risk management is a very iterative process and once the project gets underway you may have hundreds of risks each with a defined owner monitoring and managing it. At this stage a tool such as our Project Controls Database can help you keep track of mitigating actions and their effects and help you manage when a potential risk becomes a live issue.

Making A Step Change

The emphasis of this infoKit is on creating new types of learning space. Even where new build projects are prompted by the fact that existing buildings are simply not fit for purpose, colleges and universities are rising to the challenge and finding opportunities to do things differently and to improve learning and teaching. In many cases these improvements are closely linked to the use of new technologies.

Case Studies
- Edinburgh's Telford College
- Glasgow Caledonian University
- New College Durham

Many organisations such as Edinburgh's Telford College, Glasgow Caledonian University and New College Durham have also made significant change to business processes on the back of a new build. Telford has introduced 'hot-desking' and not even the College Principal has an office! We look at the issue of business process improvement in the Imagination section under Imagining Future Processes.

Step changes in ways of learning and teaching and in ways of doing business need to be carefully managed if stakeholders are not to feel disempowered and resist the change. New College Durham noted that its move had many of the key aspects of a merger as it brought together two previously autonomous sites and Matthew Boulton College noted that the introduction of learning technologies meant many staff saw the change as a new job as well as a relocation.

JISC infoNet has an infoKit on Change Management highlighting a range of approaches that have been shown to work in the sector and particularly drawing on experiences of implementing e-learning in recent years.

Those leading learning spaces projects are recommended to explore the Change Management infoKit especially the sections on:
- Change Strategies and Approaches
- Change Roles
- Transition Management

Business As Usual

It can be a real challenge to manage an existing space at the same time as developing a new one. There are some major practical issues to bear in mind. It is important that the inconvenience to your users is kept to a minimum. They will continue to require access to equipment, the network and so on right up until the closure of the existing space and again when they move across they will have expectations of what level of technological and other services should immediately be available to them in the new space.
You may find it useful to pilot some technology in your current environment before moving across; Matthew Boulton College did this by implementing and testing new technology several months before their move. There is always the possibility that a piece of technology you switch off in one building does not, for a number of reasons, re-power in the new space. Try to factor this type of potential occurrence in by preparing the ground, using back-up arrangements where possible.

Planning The Move

You need to plan a practically seamless movement of your IT systems across from one site to another. It may be possible to temporarily organise an additional JANET connection in order to cover the removal and re-installation of your core networked systems.

You may decide to install all new technology in your new build in which case you must set aside enough time for installation and set up (this can be a considerable undertaking if there are several hundreds of PCs). Don't forget that installation of existing equipment also has a large resource overhead.

There are a number of professional removal companies available who can help with the removal of technological equipment, library stock, chemicals and other material. Make sure you leave enough time to research the help available that can best suit your requirements. An example of the type of specialist removal you may encounter in your own institution is the Matthew Boulton College experience. They needed to remove a 5-colour Heidelberg press and reinstall it in their new building and this could only be done by specialists. This type of activity can be difficult to schedule in alongside other removals especially when you are relying on the availability of specialists so you need to plan as well in advance as possible.

It may sound obvious but plan the move so that furniture and equipment arrive in a reasonable order - desks before PCs, library shelves before library books and so on.

Remember to factor in any staff development considerations into your planning in order to ensure that staff are as confident as possible in the use of any new equipment and are also familiar with the new space. Spending time on this with staff will help ease the transition of all users to the new space. As mentioned previously, take care with the timing of staff development activity in order to get the best possible outcome.

Practical Tips: Implementation

You may find some of the key practical hints and tips gathered here can give you a head-start. Our expanding collection of online Case Studies also feature the facility to sift through the material by section - so you can look at lessons learned and top tips from across a range of institutions.

View the full list of Top Tips sections from our Case Studies

View the full list of Lessons Learned sections from our Case Studies

New College Durham
The Principal needs to play an active role not just hand over to experts. The longer you take on the actual build the more difficult it is to control costs and manage change requests. Haggle and double-check. Keep a tight rein on change control and keep good documentation.

Matthew Boulton College
Plan early, train late. Bear in mind that the whole procurement process takes much longer than you would think (OJEC tendering can prove particularly time consuming) - try to build this time into the project plan. Don't talk to suppliers too early or you can spend all your time in sales meetings. Consider holding an
open suppliers briefing to ensure that everyone gets the same messages and to save time. The fit out and the move need to be well planned if damage to finishes is to be avoided.

City Lit
Project Management is vital.
Make sure the builder leaves manuals for equipment, guarantees, locking box keys, etc.

Glasgow Caledonian University
Schedule some time to make changes and respond to things that are not working so well. Consider a reserve for changes.

John Wheatley College
Plan well ahead. The user brief for the building was prepared two years before the design of the building started.
Involve all staff in the preparation of the user brief and the revisions during design stage. Groups of staff meeting directly with the architect worked very well.
Have a defined management control system with only one person responsible for advising the design team and contractor.

Northumbria University
Most of the stock in the building moved more than once during the refurbishment, requiring very detailed planning and dovetailing with building work, as well as careful publicity so that users could find the services and materials they needed.
Work took place throughout the year, requiring close co-operation and liaison with contractors to minimise disruption to students. Their understanding of critical periods in the academic year was essential.

University of Sussex
You need to make sure that you factor into the project planning, points where you can stop and review and check and buffer zones because it's a very complex process that challenges most educational institutions.

St Martin's College
Ideally staff working on the project team should be seconded to it for a proportion of their time.
Check and double-check specifications even if contracted to a third party. Allow sufficient time for testing and kit out after the building has been handed over.
Manage the expectations of stakeholders throughout.
Recruit staff earlier than you think to allow training and orientation.
Keep rigorous records of decisions taken, audit trails and procurement.
Consider contingency plans for technology teething problems, have alternatives available.

Practical Tips: Change
You may find some of the key practical hints and tips gathered here can give you a head-start. Our expanding collection of online Case Studies also feature the facility to sift through the material by section - so you can look at lessons learned and top tips from across a range of institutions.

View the full list of Top Tips sections from our Case Studies

View the full list of Lessons Learned sections from our Case Studies

University of Cumbria (formerly St Martin's College)
Appoint an architect and project manager that really understands the project and what it is trying to achieve; don't be frightened to challenge the established wisdom that was once the province of Estates.
Be bold; if the project is experimental - say so.
Disseminate the benefits of the project and think about how best to engage your user community.
Think about the support for users at a very early stage.
Use language and terminology that describes the intended use of the building - not necessarily how it might have been used in the past.
Manage expectations: just because it is a new space it doesn't mean it can solve all problems for all people.
Build trust in the users so they will feel empowered to use the whole range of equipment and ask for support when required.

New College Durham
Be realistic about how long the design stage takes...you only get one chance and it's worth the effort to get it right up front.
Build in maximum flexibility to respond to changing needs.
Think about the next 20 years and be prepared to live with every decision you make.
It is difficult for academic staff to create a vision when they are fully engaged in day to day activity.
They incline to do what they already do in better surroundings. The opportunity to challenge what is taught and how could be missed.
You have to present academic staff with a vision and challenge them. People have difficulty understanding plans and they can't visualise what the build will look like. They find it very hard to think in 3D.
People don't expect to change the way they teach even when this is part of the vision.

Northumbria University
It takes time for changes to bed-in and students may not always use the spaces in anticipated ways - do not get disheartened and be patient.

Matthew Boulton College
A new build is an ideal time for change but undertake it before the move. Step changes are possible.
The best innovators are the teachers but they need the tools.
It won't all work on day one!
There were cultural changes involved including the moving away from paper based records, it was difficult for some staff to surrender some of the paperwork they had accumulated over many years.
The use of technology was a step change and challenging for many staff. Significant ongoing training is required. The move was seen as a new job not just a relocation.

Durham University
The first year the Techno-Café was open the students had huge adjustment problems. They liked the facility but they had become ingrained in old ways of doing things. It was actually very hard to encourage them to use any other approach to working.

Glasgow Caledonian University
Look at what information you have on services as an indicator of how to change things. If there are gaps back-up major decisions with research.
Lots of appropriate situational technology is better than 'high-tech' solutions that few understand.
Encourage people to bring and use their own technology.
If it is innovative and in line with the learning and teaching strategy, and other relevant strategies such as the estates strategies; that doesn't mean that everyone is going to like it.
Celebrate the opening. Prepare resources for academics to introduce the new facilities to students.
Visit other places to see what you do not want to do as much as what you do want to do.
Be innovative.
University of Sussex

Visual representation is important. It is difficult for people to buy in to something they can't fully understand. Get a representation quickly so that people know what you are talking about.

---

**Evaluation**

This resource is not one to be used in a linear fashion. As soon as you have developed your vision you will need to be thinking about how you will know whether or not you have succeeded in delivering it. Moreover success is not a fixed goal - you need to consider how you will identify changing requirements and adapt to meet them. We look at some ways you might go about doing this and some of the reflections of others who have gone through this process. Many of the projects featured in this resource are very new in 2007 and we will be revisiting them as they evolve to learn from their experiences.

**How Do We Know It Has Worked?**

'...designing a learning space is an organic and iterative process that continues long after the space is complete.'

Chris Johnson and Cyprien Lomas

Evaluating how well your project does what it set out to do is important not only for measuring its success but also to make sure that the facilities that you have developed remain fit for purpose as needs change. It is the ability to meet expressed needs that should drive the project evaluation. Ideally your pre-project work to define what facilities were needed and how they would work will have done some analysis of the requirements for the new space that you developed. These requirements will give you an idea of what success might look like. It makes sense, therefore, in a post occupancy evaluation to consider using some of the tools that were used for the development of the project in the first place.

You also need to consider what sort of evidence can help you manage, develop, and change the use of the space over time. Clearly some of this will be quantitative - measures of levels of use etc - and some will be qualitative - how people feel about the space for example.

The first port of call for evaluation data should be data collection activities that are already taking place in the institution. Library-based projects, for example, may well have data readily available from before and after the project as libraries typically collect large amounts of user data. Similarly several universities and colleges have ongoing Student Evaluation Projects, and if yours does then the data and opinions collected here will be very helpful especially as these data collection departments usually operate independently of the space and service provider. This data tends to be quantitative
and you will need to think about how you can add a qualitative dimension so that you get as full a picture as possible about the space is working.

'Actually closing the assessment loop by putting data into decision making is not an easy thing to do - even in one's own classroom, much less at an institutional level'

Association of College and Research Libraries

What Is A Successful Learning Space?

This is discussed in Design of the Learning Space: Learning & Design Principles by Chris Johnson and Cyprien Lomas, EDUCAUSE review July/August 2005.

Is a successful learning space:

- One that is being used in the way in which the designers envisioned?
- One in which the space is productively used in ways not originally envisioned?
- A space that is always busy?
- A cost-effective space?
- One that promotes deeper learning?
- One that provides the type of arrangement/amenities needed to support a learning activity?

The Learning and Skills Council suggests the following criteria should be reflected in all new projects:

- Innovation and Excellence - is it an innovative and high quality new style of learning environment for the 21st century?
- Adaptability - can the design accommodate changing learning styles through flexible provision?
- Manageability - will it be easy to manage and make effective and efficient use of staff?
- Accessibility - is it an inclusive and accessible place for learning that supports engagement while providing a safe and secure environment, accessibility to learning systems, technology and resources?
- Atmosphere - does the design create a 'feel good factor' for learners and staff?
- Sustainability - how effectively does the design consider climate change, sustainable materials, energy efficiency, transport, physical quality of the learning environment re: daylight, air, and acoustics?

Evaluating Use Of Technology

'If you're not going to support the technology, then don't put it in the classroom. It's worse than not having it.'

Bill Lewis, Arizona State University

Evaluating and maintaining technology is vital to ensure that it continues to be relevant, useful and up-to-date. Christopher Johnson talks about how technologies can change: today's cutting edge gizmo may not be relevant tomorrow.

When it comes to technological developments, obsolescence can arrive at speed and this can make you feel disheartened, as well as being expensive for those holding the purse strings in institutions. It can be argued that this is just one of the realities of the digital age. Johnson recommends that the availability of new technology should be balanced with the acceptance of a given innovation by both instructors and students. He believes that, 'constant evaluation and assessment will ensure that support goes where it is needed the most. Well-used and well-supported spaces will help institutions meet the learning needs of our Net Generation students'.

The following sections list some of the ways in which you might want to collect information to evaluate the effectiveness of the space.
Questions To Ask

Collection of data involves asking questions such as:

'How many users are using the space?'
'How is the space being used?'
'What technology is being used in the space?'
'Do potential users ever need to be turned away (due to lack of space)?'
'What are the equipment costs involved?'
'What are the costs involved in the servicing of the space?'
'How frequently are help services used?'
'What are user expectations?'
'Do users feel satisfied by the overall experience of the space?'
'What are the most important aspects of the space for users?'
'What are the least important aspects of the space for users?'
'What changes are required to improve the space?'

Glasgow Caledonian University's Student Evaluation Project has been operating since 2001 and regularly surveys students at the University on their likes and dislikes about student life.

The survey includes questions on satisfaction rates on social, private and group study spaces as well as University services. It also collects information on student ownership of IT equipment and their use of University IT equipment. The data collected by the project is fed back through the university structures and used to help 'make life better for students' at the University and, also 'to make sure that Glasgow Caledonian University staff understand the students they teach'.

Assessment can cover 6 broad areas:

- Extensiveness
- Efficiency
- Effectiveness
- Service Quality
- Impact
- Usefulness

Collecting Data

Collecting Quantitative Data

This can take a number of forms, for instance:

- Numbers of users over time - can be collected automatically by magnetic swipe or Radio Frequency Identification (RFID) sensors
- Equipment loans (such as laptops or PDAs) - dates of loans, length of loan, course of study

Collecting Qualitative Data

This can also take a number of forms, for instance:

- Video diaries
- Written diaries produced by users
- User blog sites
- Web forum. An example of this is a small item on changes in learning spaces, where students choose to learn and the spaces they like on Heriot-Watt University's Students Association Forum.

Methods For Collecting Both Quantitative And Qualitative Data
• Feedback questionnaires
• Focus groups - using the variety of stakeholders described in the section on Working With Others
• Behavioural observation - how do users interact? What group sizes are most common?
• Photographic studies - The University of Dayton in Ohio has used the photographic study approach in three innovative spaces. Photos are taken every hour for a week recording the configuration of furniture and the uses to which the space is being put. The study will continue at intervals over a number of years and changes in the use of space will be recorded.
• Edge Hill University chose to take an ethnographic approach to evaluating their SOLSTICE Space, focusing on student and tutor experiences on a particular foundation degree module over ten weeks. This approach included observation of sessions, student focus group interview (followed by further paper-based questions) and tutor reflections. A presentation by John Davey, Manager of SOLSTICE, complements the Edge Hill case studies.

'By including experimentation and an appropriate means for measuring success into the design process of a learning space, the planning team can create an opportunity for greater longevity and flexibility in the learning places. In the best cases, it may also observe an evolution of practices that are associated with a new learning space'.

Chris Johnson and Cyprian Lomas

Entrepreneurship and Business Start-up Spaces

Changes to business start-up spaces have generally been as a result of feedback from the clients. Some examples as to the type of changes are:

• SETsquared Bristol - relocation of pre-incubation open-plan space to more 'alive' part of Woodland Road with a change in colour scheme. Also a mobile (wireless) conference phone has been installed. These changes have been made as a result of ad hoc feedback
• InfoLab21 - introduced new Italian purpose-built incubation pods in one of the larger rooms to provide more flexible office sizes and made some modifications to the office to suit particular needs of the businesses. Lancaster University says that it constantly evaluates how InfoLab21 residents are doing and whether there's any support that can be provided to them or signposted to them. As well as the InfoLab21 incubation space manager, who facilitates the moving process and sorts any practical day to day issues out for the residents, each resident has a business development contact who visits each business regularly to gain feedback, determine their needs and facilitate technology transfer
• SETsquared Surrey - There is now an Extranet for the Surrey Research Park that companies have asked for - it has proved valuable for getting messages, profiles etc across. There are
some big companies represented in the Park including Microsoft so it provides a means to get involved with, and be updated on, activities

- The University of Plymouth has recently conducted an evaluation survey and as a result will be developing its business support offering even further and is looking into updating its client payment systems
- The University of the West of England has provided additional storage, and dividers between the desks in the open plan areas in response to the needs of the client base and evaluation as to how the space is used
- Developments at Manchester Metropolitan University's Innospace have been made since it was opened. For instance a permanent large meeting space with solid walls has been built within the space - this had been partitioned off previously but it was recognised that there was a need for a more permanent and private space. Innospace initially focused on providing tenant businesses with a structured mentoring programme but feedback suggested that this method did not suit the businesses and so they now focus more on creating a supportive environment and a community of businesses that works together. Informal mentoring sessions are provided with tenants liaising with the Innospace Management team on specific needs

www.flickr.com

The U.S. Perspective

'In one classroom with no tables, just comfortable chairs in a circle, one faculty member consistently pulled a table in front of her seat and lectured from that position.'

Hunley & Schaller, Educause

The EDUCAUSE eBook Chapter on Assessing Learner Spaces looks at feedback on learning spaces in the US. It outlines situations that encourage and discourage students with regard to the use of Learning Space including comment on evidence that academic engagement is encouraged by learning spaces that are 'comfortable, open, flexible and appealing'.

Engagement for students was found to be higher when the settings and academic activities involved encouraged technology-supported interpersonal interaction. Students described classes in one of the innovative spaces as requiring more accountability on their part because there were few physical barriers between themselves and their tutors. Students were most engaged in settings and in academic activities that encouraged interpersonal interaction and were supported by technology. By comparison, in more traditional classrooms with seats arranged in rows and the instructor at the front of the room, they felt they had less responsibility for participation.

Poor air circulation, uncomfortable temperatures, non-interactive pedagogical practices and distractions were also identified as factors that actively discourage student engagement.

Feedback from staff on spaces can differ significantly. Some staff will embrace the space and be very open about their use of it and its potential, whilst others will endeavour to replicate a traditional lecture theatre feel in the space.

The University of Georgia have kindly provided a summary of their experiences of evaluation relating to their Student Learning Center.
Using Evaluation And Review

Once you have evaluated the space and collected feedback on its use, it is important that you provide users with evidence of what you have done, whether the outcomes are positive or negative. Include this in your communications strategy. Posters showing numbers of users, speed of queues for services, and so on can be an excellent tool to show what is happening in the space, and if you can give a comparison on a previous month showing an improvement over time then that is even better. Newsletters and web pages are also excellent platforms for this type of information. Use the following link to view a mindmap on the evaluation activities for the Learning Grid at the University of Warwick.

If the feedback is negative then it is important to plan what you are going to do about it. Is there an identified problem that can be easily fixed or is it insurmountable (due to perhaps physical or financial factors)? Either way a response is required.

Any feedback, whether it appears on first sight to be positive or negative, can be useful to the development of your space. Users may have practical ideas that you did not think of in the planning and designing stages and the implementation of which can result in real added value to the space.

References


16. Weaver, Margaret. St Martin's College Case Study.

17. Graetz, Ken A. & Goliber, Michael J. Designing Collaborative Learning Places: Psychological Foundations And New Frontiers. New Directions For Teaching And Learning, 92, Winter 2002

18. Dr Tony Hall and Professor Mike Sharples of Learning Sciences Research Institute, University of Nottingham and Peter Lonsdale, School of Computer Science, University of Birmingham


34. Meyer and Davis. It's alive.


37. Peter Day


39. Michael Turpie, Telford College Case Study (?)

40. Prensky (2001)


42. Alan Kay

43. Danny Hills


45. Lippman, Practice Theory, and the Design of Learning Environments


   http://www.ogc.gov.uk/Introduction_to_Procurement_sustainable_procurement.asp
49. Callaghan, Debbie, Agenda for Change- Colleges for the Future, Presentation At From Vision 
   To Reality Event Held At Matthew Boulton College. 13 June 2006.
50. Philip Badman, City Lit
51. The Royal Australian Institute Of Architects, You and Your Architect, (RAIA Practice Services)
53. Tom Coffield, The Curious Group
55. Johnson, Chris and Lomas, Cyprien. Design Of The Learning Space: Learning & Design 
56. Association Of College And Research Libraries. Assessing Learning Spaces. 16th October 
57. Johnson, Christopher. Sustaining and Supporting Learning Spaces. Chapter 12 in Oblinger, 
   Diana (Editor). Learning Spaces. E-Book. EDUCAUSE. 2006 Available At 
58. Bill Lewis, Arizona State University