

Higher Education Space

Future Directions

Physical space should be seen as an asset, not a liability, and space use policies need to be addressed in institutions' strategic planning processes.

by Paul Temple and Ronald Barnett

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Introduction

Changes in the ways that universities work are leading to demands for more flexible and highly serviced spaces and to the blurring of the boundary between academic and social areas, but are not diminishing the overall net demand for space. These changes do, however, require a different approach to both the physical planning process and institutional strategy.

Space costs, or to put it more formally, the operating and maintenance costs of the university's estate—its buildings, grounds, and the infrastructure that supports them—make up the second-largest element, after staff costs, of most higher education institutions' budgets. Despite their financial significance and the obvious fact that all staff and students are affected by the design and maintenance of the estate every day of their working or studying lives, space issues have not figured prominently in the academic study of higher education. Most writings about space in the university have come from architects, designers, and facilities managers. Those responsible for the wider management of universities and colleges tend to adopt rather short-term, cost-driven approaches to space use that consider the estate as a liability rather than an asset (for example, Locke 2004).

The question of space goes beyond the annual budget. Its physical presence defines the university in a variety of ways, some obvious and some subtle, and to an extent conditions how interactions within the university take place, how people feel about themselves and others, and how interactions with the outside world occur.

The question of space goes beyond the annual budget—it defines the university.

A wider debate among higher education managers and researchers about these issues is required. Few conceptual frameworks exist for understanding the connections between the physical form of institutions and their academic effectiveness—and perhaps their sense of place. The literature asserts the existence of a link between space design and learning, often in a highly plausible way (Dittoe 2006; Flutter 2006; JISC Development Group 2006). Findings from psychology, sociology, and environmental behavior have also been applied to the design of learning spaces (Scott-Webber 2004). Other work draws attention to the messages that architecture and design might implicitly send: universities, claims Edwards (2000), “have the almost unique challenge of relating built fabric to academic discourse...buildings need to be silent teachers” (p. vii). Although similar claims have been made about primary and secondary school buildings (for example, Uline 2000), Jamieson (2003) argues that “the relationship between the ‘places’ provided on-campus and the quality of the student learning experience” (p. 121) has not been adequately defined. This large task is not attempted here; rather we have attempted to clear some ground as a preparation for later work.

Empirical Base

Our task, as part of the wider UK Space Management Project (see www.smg.ac.uk), was to offer a perspective on the future space needs of higher education. To this end, we selected a broadly representative group of seven higher education institutions in England as a convenience sample. This study included research-intensive, teaching-oriented, and specialist institutions in London, in other English cities, and on out-of-town campuses developed over the last 40 or so years. We conducted a series of semistructured interviews—that is, using a standard set of questions but

allowing the discussion to develop according to the respondent’s answers, thus incorporating both qualitative and quantitative research techniques—with academic and administrative staff. At each institution, we interviewed a small group of senior administrators, along with senior academics (usually deans or department heads) and professional staff with space management responsibilities. (The number of interviews varied broadly in proportion to the size of the institution in question.) We viewed space usage of various types and discussed design and use issues related to the space with institutional managers. We also held discussions on an opportunistic basis with some student and staff users. Subsequently, we analyzed the interview transcripts and extracted the key issues, which we then compared with data from the other interviews before drawing our conclusions. While this survey was far from exhaustive, we were able to identify the main factors affecting space needs in the UK higher education system.

We explored the use of space by referring to categories of potential change (reduced space use, changed use within the current space envelope, and increased space use) and the factors that might drive these changes. These factors are summarized in figure 1; this information provided the starting point for the interviews.

These studies were not intended to predict the future size of the UK higher education estate, but rather to identify how the drivers of space demands for any given number of students and quantity of research work are changing and might change further, thus potentially affecting estate decision making. The emphasis throughout is on *unit* space needs: the defined amount (a unit) of space needed to teach one student.

Space and the University’s Role

Higher education will, over coming decades, come to occupy an even more prominent place in the national life of all advanced countries than it does now (Duderstadt 1999). Developments arising from what is now thought of as the knowledge society will make the university’s role in the production, understanding, application, and transmission of knowledge fundamental to most elements of social and economic activity. Accordingly, higher education seems likely to become one of the largest global industries in the next few decades. In Europe, the central role of the university in the knowledge society has become a particular focus of debate (European Commission 2005).

**Higher Education Space:
Future Directions**

Figure 1 **Change Drivers in Space Usage**

CHANGE DRIVERS		
Reduced Space Use	Changed Use Within Current Space Envelope	Increased Space Use
Increased efficiency in space use	Increased student and staff numbers	
Increased distance learning/ information technology (IT) facilities	New teaching methods (including IT use)	Research needs
“Portfolio” staff not working in institution	Lifelong learning causing new space mix	Enhanced community use of facilities
Increased staff/student ratios leading to unit space savings	Move to higher-value activities	New health and safety/access demands
Workplace-based learning	Changed approaches to library use	Pressures for better facilities from competitive student markets
Space redesign/restructuring of functions		New central infrastructure demands (marketing, quality)
Changed subject requirements		

Might an enhanced role for the university mean that

- physically it becomes more dispersed and protean and its location less relevant or, at least, that the traditional campus becomes only a minor part of its total “virtual estate”?
- it becomes embedded in a whole range of other public and private institutions (for example, workplaces, shopping centers, and cultural venues), taking advantage of far more flexible and powerful information technology devices as a face-to-face yet virtual university (Agre 2002)? Might academic staff be found more usually off-campus, whether in research collaborations or teaching?
- programs of study are built increasingly around work experiences or services within the community? Developments along these lines were predicted when Harrison and Dugdale (2003, p. 33) wrote that “increasingly organisations [such as universities] will move outside of the physical container of their own buildings.”

Another part of the equation is the fact that one of the university’s most remarkable features is its durability as a coherent entity, both organizationally and physically. Clark Kerr (1987) made the often-quoted claim that, of the 85 or so institutions in the Western world established before 1520 still existing today in a recognizably similar form, 70 are universities. This organizational stability reflects paradoxically the university’s evolved skill at handling change: an apparently unchanging exterior masks a constant interior turmoil of ideas, understandings, and approaches.

This current work emphasizes the powerfully integrated nature of most of the institutions observed. This integration, and the institutions’ organizational stability, seems to derive from internal cross-boundary work—the connection of teaching with research, the connection of the academic with the social dimension of enquiry, and the relatively nonhierarchical connections between senior and junior academic colleagues. It is the preservation and development of this integrated form, with its dense network of connections, that provides many of the management

and planning challenges in higher education. As well as driving enhanced effectiveness in terms of learning and research outputs, these integrations plausibly produce economies of scale and reduced transaction costs. Thus, for universities, the whole is *greater* than the sum of the parts.

It may be argued that the university's more or less coherent and continuing physical presence supports the operation of these integrative features and so contributes toward a resilient organization. The demands of integration in turn support the claim, in internal debate, for physical coherence. Comments by academics at a research-led university in the heart of a major city emphasized their strong preference for cramped, substandard offices and laboratories at the center of the academic action, rather than for more spacious accommodations some miles away. Similarly, we studied a large teaching-oriented university currently operating on a number of small campuses across a wide rural area that is in the process of consolidating, at considerable cost, on its main city-center campus. The embedded, distributed university seems not to figure in the objectives of either of these very different institutions.

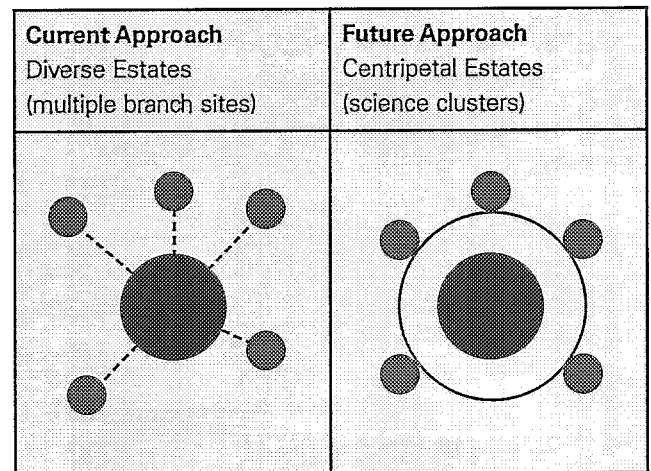
This need for physical coherence and convergence may also help to explain why the "branch campus" approach to university organization—on the face of it, a sensible way to spread the benefits of academic excellence more widely—is usually problematic in practice: there are no important multinational universities and most multicampus universities face a constant struggle against centrifugal forces trying to pull them apart (for a case study, see Pritchard 1994). This need for physical coherence is part of the explanation of why, as Kerr (1987) observes, so many pre-1520 universities are on their original sites, with some still using their original buildings. It is why effective universities will not move toward giving up large parts of their core space and instead purchase "space...on demand, on an hourly, daily, or monthly basis" (Harrison and Dugdale 2003, p. 34). (A further, strictly practical, reason is that, very often, hardly any commercially available space is immediately suitable for teaching use.)

The physical form of the university, then, is related to its academic effectiveness, although in ways that are not fully understood and that may often be overlooked when planning decisions are made. One recent study of university design made this point neatly by quoting Winston Churchill (from a 1924 lecture to the Architectural Association in London) to the effect that "we shape our buildings and

afterwards our buildings shape us" (Jamieson et al. 2000, p. 221). This suggestion is not the same as saying that building design or use should drive academic organization or practice, but rather acknowledges that the interplay between buildings and their uses—and users—is subtle and complex.

To offer an answer to the earlier question about the university's future physical form, it is more likely that rather than the university becoming physically dispersed, other organizations will wish to cluster around it both physically and conceptually, thus increasing the university's centripetal power (figure 2). The growth in the United States, the United Kingdom, and elsewhere of university science parks—where knowledge-based firms spun-off from the university's research endeavors remain clustered in its locality and, through network effects, attract others—is an example of this phenomenon. Demand and planning constraints will mean that the price of space within and near important research universities will tend to increase in the long run. University science parks in the United Kingdom and the United States show this working in practice, with the implication that planning strategists must look at adjacent properties and identify those where the local and potential design fit science park criteria.

Figure 2 Estate Planning: Current and Future Approaches



It has been argued (at least until quite recently) that distance e-learning will become so pervasive as to halt, or at least to slow, the physical development of campuses. Daniel (1998) stated that "new educational systems will be created by technology-based teaching. They will eliminate geographical and jurisdictional boundaries...[it will be] a

Higher Education Space: Future Directions

Figure 3 **Exogenous and Endogenous Factors Affecting Space Demands**

Space Demands	High	Student demands International students	Managerial factors Pedagogical methodologies Governmental policies Monetary influences
	Low	Wider societal relations (town/gown) Space inefficiencies New flexible spaces	Morphing academic disciplines Research demands Information technology Staff increases/decreases
		Low	High
Institutional Impact			

world in which traditional [methods of] higher education will no longer work" (p. 28). A similar view is that "the impact of information technology...[is] challenging the historic models of what a university is" (Harrison and Dugdale 2003, p. 34). Claims of this kind are generally unfounded, and new technologies for teaching and learning are likely to have only a limited impact on universities' space needs (although they may ultimately have significant pedagogic impacts).

Exogenous and Endogenous Factors Affecting Space Demand

Space requirements in higher education are determined by *exogenous* factors (those originating beyond the university), covering relations with the wider society, student demand, government policies, and so on, and by *endogenous* factors (those emerging from within the academy, broadly defined), covering changes within academic disciplines, new pedagogic methods, organizational changes, and other internal issues (figure 3). The two sets of factors may interact: changes in governmental policies, for example, may affect organizational structures.

Exogenous factors are usually extremely hard to predict beyond a short-term horizon of a year or two. In the United Kingdom, for example, current *governmental policies* for increasing and widening (in social class terms) participation in higher education have had a major impact on space planning, as exemplified by the new buildings seen at many universities. But political change could, just as conceivably, halt or even reverse these policies. The

impact that such changes have on actual space use depends on a range of unpredictable variables, such as the budgetary situations (monetary influences) of the institutions concerned at the time and the conditions elsewhere in the world higher education market.

International students are another exogenous factor in space matters. Their numbers are subject to considerable fluctuation for various economic and political reasons. International students form only a limited proportion of most universities' student populations; however, where special physical provision is made for them (for

example, different residential accommodations), sudden changes in their numbers will have an impact on space use.

An additional exogenous consideration is that of *changing student subject preferences*, exemplified in the United Kingdom by the current swing in demand away from mathematics, science and technology, and foreign languages. In most cases, space for currently undersubscribed subjects will probably continue to be provided, although in slightly reduced quantity, as it has long been for "minority" subjects considered to be nationally important. When a subject closes entirely at a university, its space is typically, in a generally growing market, reallocated to a growing subject. The net impact on total space need is, accordingly, likely to be limited.

Three broad sets of endogenous factors will affect higher education's demand for space during the next decade. One factor is the *change in the nature of academic disciplines*, which causes them to need either more or less space to undertake the same quantity of teaching and research as now. Another will be *changed pedagogic approaches*, which affect the size of student groups, the frequency with which they meet, and the type of space they need. The third set of factors is *managerial*, covering issues of institutional organization, structure, and methods, including changes to the length of the teaching day or year, space allocation methods, and technological changes (particularly in information technology). The impact of these factors on space use will be determined by organizational changes of various kinds. Of these endogenous factors, managerial issues are likely to have the greatest impact on space usage, followed by pedagogic changes.

Trends in Space Management

The relationship between a university's teaching, research, and other goals and its use of space is a complex one. When making strategic choices, university management has a view of existing and likely future space availability, and there is inevitably an interaction among academic, financial, space, and other considerations in the decision process. Universities arrange the production of teaching, learning, and research in different ways; for example, existing space may be one factor that affects the decision to initiate certain teaching or research approaches or, conversely, the decision to initiate such approaches may lead to the provision of new space. Apparently "inefficient" use of space in a narrow sense may lead to important gains in the university's total outputs (Billing 1995). From a strategic institutional management perspective, it makes little sense to consider space use in isolation from other institutional goals.

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Universities in the United Kingdom have in recent years become more efficient (in one sense) in their use of space, teaching much larger numbers of students since the late 1980s without a proportionate increase in accommodation. This change has had the effect of reducing average gross nonresidential space per FTE student in the period from 1992 to 2001 from 158 square feet to 91 square feet (14.7m² to 8.5m²), a 42 percent reduction (Association of University Directors of Estates 2003). Since 2000, the area of teaching space has remained fairly constant, despite a further increase in total student numbers taught of 8.2 percent over this period (Higher Education Funding Council for England 2004). Space for research, however, has increased by some nine percent since 2000, driven by an increase in research grants and contracts. This decrease in space per student does not indicate that particular spaces are necessarily used more intensively; in fact, many ways of managing student learning have been devised that require a reduced space input to the learning process.

Individual departments or units have mostly lost control of "their" space, except when it is highly specialized. While this "loss" has improved the utilization of space overall, some academic staff point to a diminished quality of the student experience as a result of students being constantly on the move. This diminution of quality may arise from reduced teaching time, as students spend more time moving from one teaching session to another across the campus, rather than staying within the department; a reduced ability to conduct informal teaching (for example, providing further explanation of difficult points immediately after a lecture); and reduced staff/student social contact. In other words, the efficiency gains in space use have been bought, it seems to many, at the price of some diminution in learning and the broader student experience.

The universities we studied have also aimed to improve space use by extending the teaching day, and/or week, and/or year. For example, where the teaching day had traditionally been from 9:30 a.m. to 5:30 p.m. (0930 to 1730 hours), it now runs from 8:30 a.m. to 6:30 p.m. (0830 to 1830 hours). These two extra hours a day—the equivalent of nearly one and a half extra days per week—should have had a major impact on space utilization. However, reluctance by both staff and full-time students to attend early and late sessions for a variety of reasons (including child care and travel issues) has typically reduced the space savings which should otherwise occur. Even so, one university we visited now had 15 percent of its teaching time after 5:00 p.m. (1700 hours), using space that would otherwise have been largely unused. Over time, the extended teaching day will become more acceptable, allowing these gains to be extended.

Similarly, attempts to extend the teaching week or year have created tension with academic staff already under pressure from different managerial imperatives that demand increased research productivity, the undertaking of income-generating "third stream" activities (consultancy and the like), and so on. In one research-led institution we studied, space efficiency in the narrow sense has been deliberately sacrificed by concentrating teaching into the first two academic terms (although with only partial success) to make more time for research between April and September—a more North American model.

This tension highlights the point that in operating a university, space is only one of several production factors that must be managed to maximize a defined set of outputs. It may be perfectly rational to plan for a superficially

inefficient use of space if other high-value outcomes—important research or a high-quality learning experience, for example—are thereby achieved. One conclusion suggests the future demand for space needs will not be determined by relatively simple drivers such as student or staff numbers, but by a set of complex factors related to institutional missions and aspirations. For example, the space use pattern sought by a research-intensive university, where large research projects are funding separate specialist space uses, will differ from that of a teaching-oriented university with a regional access/diversity mission, where the emphasis will be on least-cost space utilization.

Teaching Spaces and Learning Spaces

Most studies of teaching and learning in higher education (Biggs 2003; Light and Cox 2001) focus on the cognitive and sociological aspects of the process, taking for granted the physical environment in which these processes take place. The challenges of managing an enlarged higher education system should mean that space issues form a more central component of such studies and of management concerns related to teaching and learning. Only recently has this issue begun to appear in the literature (Scott-Webber 2004); the volume edited by Diana Oblinger (Ditoe 2006) is also a good example.

A notable recent trend in the organization of university space has been the recognition of the need to provide learning space, as distinct from teaching space, for student-led learning for formal (timetabled) or informal use. This trend is particularly noticeable in library or learning center planning, where space is increasingly allocated for students to work by themselves, either in groups or individually. For instance, some libraries/learning centers have relaxed prohibitions on noise to allow for group project work. This change is apparent in both research-intensive universities and in teaching-led institutions, although the trend is more marked in the latter. We also see more intensive use of this space in longer library opening hours—24 hours during the working week is becoming less unusual, especially where many students attend part time.

The design of generic teaching space in new buildings takes into account the need for more flexible provisions that allow for different-sized groups working in different ways, perhaps even outside extended working hours, a trend that may have access and even catering implications

(Jamieson et al. 2000). Such a learner-centered design philosophy points to greater adaptability in the design of space of all kinds, including more built-in digital facilities: as one group of university designers puts it, “spatial, human and digital connections must be optimized within the building” (Kopp et al. 2004, p. 19). The most modern university buildings now provide much more of their space in units that can be reconfigured and in small rooms designed for group learning. We anticipate that this will increase, with institutions providing more space for unstructured/ad hoc self-directed learning and peer-teaching among students. This trend will result in a more varied space use pattern than previously seen, with learning center space merging into seminar group space, merging into practice space (for example, for engineering or art and design), merging into social coffee-shop space.

Little consideration has been given to determining whether such provisions will occupy more or less or the same space as more traditional facilities. One hypothesis suggests that greater flexibility and adaptability should reduce present hard-and-fast distinctions between space types and so allow for more intensive use. This greater intensity of use might be predicted to lead to a reduced overall demand for space for a given student load. Any such reduction is likely to be small, however.

Learning space is also occasionally provided in the form of rooms with banks of personal computers, printers, and other technology available for general student use or sometimes for informal teaching. Connections to the university network in student residences and the introduction of wireless systems throughout campus, allied with virtual learning environment (VLE) systems, are leading to the situation where almost any space can be used by someone with a suitably-configured laptop for writing, studying lecture materials, or communications. No evidence was found, however, that VLEs would of themselves lead to space savings as distinct from efficiency gains (mainly time savings) for staff and students; rather, the implication is for increased flexibility in space design.

The demise of the formal lecture has been long predicted, based on empirical findings as to its general ineffectiveness as a means of learning. However, according to our findings, this teaching format will not be changing in the United Kingdom in the foreseeable future. The lecture is still seen, particularly in the first year or so of the undergraduate course, as a means of inducting students into a discipline. Students themselves are said to have

objected to planned reductions in the number of formal lectures. Some universities are now in fact building new lecture theaters, as increased student numbers mean that existing lecture theaters are inadequate. More creative design of lecture theaters (with horseshoe-shaped layouts that allow for better eye contact, for example) and easier-to-use technology mean that lecturers are able to present material through a variety of media and to demonstrate processes and interact with students in ways that once would have been impractical. Developments such as these can help ensure that "higher education is much more a set of experiences that the student inhabits, experiences that arise out of the student's interactions with his or her 'learning environment'" (Barnett and Coate 2005, p. 44). These changes may partly account for the continued popularity of the lecture, although its nature may be changing to include these more interactive forms.

At a postgraduate level in the humanities and social sciences, there is a move toward providing the equivalent of a laboratory environment. This laboratory would be an area where students could work both individually and in groups, with access to advanced computing and facilities such as virtual reality environments. It is likely that such facilities will attract research partners from outside the university to work on joint projects, with a net result of an increased load to manage.

Research and Disciplinary Change

The conclusion we have drawn from discussions with academic researchers from a wide range of disciplines is that the very major changes in the intellectual content of disciplines over recent decades, coupled with the associated technological changes, have actually led to little net change in space requirements once general teaching space (related to increased student numbers) is removed from the equation. Most researchers, on the basis of past experience, took the view that changes in disciplinary understandings as such were unlikely to lead to major changes in net floor space, either plus or minus, in the foreseeable future.

In science and engineering research and graduate teaching, the trend in recent decades is that equipment using existing technologies shrinks in size, has a wider range of applications, and becomes more easily portable, while equipment using new technologies tends to be, at first, much larger and more immobile. This trend means

that net space demands stay roughly constant, although efficiency gains are often produced as more staff and students are able to use the smaller items of equipment. These gains occur when scientific advances allow previously highly specialized equipment to be used by researchers working on a wider range of problems and as better equipment produces faster results; the application of crystallography was one example given of this process. The use of such equipment, allied with Internet connections, also facilitates interinstitutional collaborations, but again, the impact on space needs appears to be very limited.

An exception to the general picture of space saving in the natural sciences through technological progress is where radically new science and technology is concerned. A historical example is when nuclear science and engineering began in universities and nuclear reactors and other highly specialized and expensive facilities had to be provided. The current example often mentioned is nanotechnology, which demands separate buildings or parts of them purpose-designed to prevent external vibration, as well as highly specialized equipment. Although this field is attracting very large amounts of research funding, the costs of the work are so high that it is likely to lead to only small net space demands across the sector. It is perhaps likely that future radical scientific and technological developments will be so expensive that they will need to be concentrated at a small number of national or international centers to which researchers will travel (as with CERN, the European Council for Nuclear Research), with a concomitant small impact on space across the sector. The current international collaboration on fusion research, where the costs are being shared between Europe, the United States, Japan, and Russia, is perhaps a case in point.

While in science and technology there are signs of an erosion of the distinction between teaching and research space, in the humanities and social sciences the movement appears to be in the other direction. For example, one university has recently established, jointly with a neighboring institution in a separate building, a "knowledge laboratory" to research the changing relationships between learning, knowledge, media, and technology. This research is both social and technical in nature, drawing together a multidisciplinary team from the two parent institutions. More research initiatives of this type in the humanities and social sciences may be expected, using more temporary research staff and requiring more highly serviced space than was usual in the past for work in disciplines other than

Higher Education Space: Future Directions

the natural sciences. These developments will probably result in a small net increase in space demands.

Conclusions

Our conclusions are summarized in figure 4, which is based on the original matrix that set the tone for this study.

The future of universities, in the United Kingdom at least, over the coming decade is one of both continuity and change: continuity, in that the university in its more or less current physical and organizational form will continue to be the dominant producer and transmitter of advanced knowledge; change, in that the university system will have to cope with an increased range of social, economic, and

disciplinary pressures, leading to increased institutional diversity.

Identified pressures suggest that higher education institutions will need more space, but other factors point in the opposite direction. The last decade has seen greatly improved efficiency in the use of space in UK higher education institutions in terms of the amount of space per student, but these gains are at (or close to) an end; further efficiency gains will seriously compromise learning and research effectiveness. It is expected that the items listed under "reduced space use" in figure 4 will have only limited effects.

On the other hand, the "increased space use" items will not have a major impact either, assuming there are not

Figure 4 **Summary of Conclusions**

Change Drivers	Reduced Space Use	Changed Use Within Current Space Envelope	Increased Space Use
Institutional planning and management	Changed teaching/research mix		
	Extended teaching day/week/year	More space for taught and research graduate students	
	Staff working away from institution	Increased community use of facilities	New central infrastructure functions
	Better space management techniques		Higher standard/more extensive student facilities
	Increased student-staff ratios (leading to unit space savings)		
	Remodeling and better design of new space		
Changes to teaching and learning	Workplace-based and itinerant learning	Changed approaches to library use	Partnerships with other institutions
		New mix of teaching space sizes	
		Information technology use leading to more flexible space use	
		Increased social/group work space for student-led learning	
Disciplinary changes	Size reductions and improvements to equipment	Changed equipment needs	New research fields requiring specialist facilities
		Specialist space for social science and humanities work	

large increases in student numbers. Across the United Kingdom, it is likely that increased demand in one institution will be offset, at least to some extent, by reductions in another. The net effect is likely to be only a small expansion.

Universities of all types will need to remodel their existing space or redevelop parts of their estates completely to address four important factors: (1) new teaching and learning methods, (2) new research approaches, (3) new technologies, and (4) new social expectations. The extent to which they make these planning changes will obviously be constrained by the capital funds available and by institutional choices of various kinds. It is by these routes that higher education will make most of its adjustments to the changed demands placed on it, rather than by major increases or decreases in the size of its estate.

The emergence of a market-oriented system of higher education makes getting these choices right increasingly important.

Space has always been, in practice, a large but partially obscured element in a university's strategy. There has been little study of how it may be integrated into the wider institutional decision-making process; this study reveals how decisions about space are bound up with a range of policy choices. The emergence in many countries of a more differentiated and market-oriented system of higher education makes getting these choices right increasingly important. A better understanding of how learning and research outcomes are affected by space design and use is necessary and, beyond this, an understanding of how space actually conditions the sense in which the university understands itself is needed. Institutions must do a better job of incorporating space use policies—and their educational implications—into the strategic planning process to help them determine, rather than merely react to, future demands from their multiple stakeholders. ■

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