To what extent is capital expenditure in UK Higher Education meeting the pedagogical needs of staff and students?

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Abstract

Capital expenditure at UK universities is rapidly rising, with new buildings erected on the premise that national and international competitiveness must be maintained. We examine students' engagement with and reliance on university estate, and explore broader questions about the extent to which university building design can support, and indeed change, students' approaches to learning. Drawing on data collected from 10 staff members and over 200 students at a major UK institution, including detailed one-to-one interviews, we capture users' often complex interactions with their university environment. Our findings confirm that when asked what would most improve their learning experience, students do not rank building design highly; interactional factors, such as contact time with staff, are considered more valuable. Our conclusion is that returns on capital investment would be boosted if pedagogical needs were prioritised more highly in the design of university buildings, and pedagogical opportunities communicated more clearly to users upon completion.

Key words: university building design, learning spaces, student engagement, technology, pedagogy

Introduction

In the UK, the Russell Group represents 24 research-focused universities. Between 2012-13 and 2016-17, the Russell Group's collective spend on capital projects was estimated to be £9 billion, 'similar to the amount spent on the Olympics or the Government's railway investment programme' (BiGGAR Economics, 2014). A key rationale for increased expenditure is that it gives individual universities an edge on rival UK institutions, as demonstrated by the Russell Group's claim that in 2010–11 the amount spent on library facilities (£284 million) was 'twice as much (per student) as other UK universities' (Russell Group 2014, p15). A recent

study claimed that capital expenditure underpins the long-term attractiveness of the UK higher education sector, offering the following explanation:

> 'The market for higher education is highly competitive so in order to continue to attract and retain the best students and staff it is essential that Russell Group universities are able to provide learning environments and research facilities that are truly world-class.' (BiGGAR Economics, 2014, p. 4)

This paper asks what a 'truly world-class' learning environment looks like, moving beyond checklists of desirable features (Harrop & Turpin, 2013) to uncover the conceptual thinking behind users' preferences. Many evaluations of capital expenditure rely on efficiency-based metrics, such as that by the Association of University Directors of Estates (2015) which noted that during the period from 2003-04 to 2012-13, income per square metre increased by over 34 per cent across the sector. However, commercial criteria can be problematic when applied to higher education (Stilwell, 2003). Investment in estates is also frequently justified by assumptions about students' use of technology and, consequently, their changing pedagogical needs (Annan, 2008). The main contribution of this paper is to test such assumptions using 'chalk face' evidence from those most affected: university students and university staff. We aim not only to contribute to the design of future spaces but also to shed light on the evolving relationship between students, their teaching staff and the learning environments that they cohabit.

Literature Review

In the increasingly marketised UK higher education system, students demand value-for-money (Buckley, Soilemetzidis, & Hillman, 2015), and research suggests that this may be partly measured in terms of the learning spaces made available to them (Kandiko & Mawer, 2013). Such spaces are often the focus of studies examining the potential disruption to long-standing educational practices created by digital technologies (Facer, 2014). Among the first to pay attention to technology and its effects on student learning were Tapscott (1998) and Prensky (2001), who introduced the terms 'net generation' and 'digital native' respectively. These terms can imply a deficiency in the traditional skills needed for academic study (Lea & Jones, 2011), but they can also be interpreted as evidence of the need for educators to cultivate alternative teaching environments (Tapscott, 1998). Prensky's (2001) work noted that newer cohorts of undergraduates were very different from those of previous generations in that they did not process information in ways aligned with conventional study. However, far from being immersed in technology to the extent that they had difficulties with more conventional approaches to learning (such as reading a book or writing an essay), contemporary students were 'adept at drawing on complex, hybrid, textual genres, using a range of technologies and applications and integrating these into both their assessed and unassessed work' (Lea & Jones, 2011, p. 390).

Brown (2005) described how universities might rethink their pedagogical approach in order to facilitate the learning of the students who had grown up in more technologically advanced times:

> 'As institutions create an anywhere, anytime IT infrastructure, opportunities arise to tear down silos and replace them with a more ubiquitous learning environment. Using laptops and other networked devices, students and faculty are increasingly able to carry their entire working environment with them. To capitalize on this, campus organizations must work collaboratively to create a more integrated work environment for the students and faculty, one that better serves the mobile Net Gen students as well as a faculty faced with the initial influx of these students into their ranks.' (Brown, 2005 p.191).

Changes in digital behaviours and the move towards more learner-centred pedagogy have both impacted on the design of university learning spaces (Radcliffe, 2008). No longer simply classrooms or lecture theatres within university buildings, the synthesis of pedagogy and technology has allowed the creation of virtual spaces (Graham, 2012). However, evidence has been mixed about the extent to which new learning spaces have been successfully 'integrated' (Brown, 2005, p. 191). Moore, Fowler, and Watson (2007) argue that the primary purpose of changes in pedagogical practices afforded by new spaces involves 'creating learning environments that challenge students to become actively engaged, independent, lifelong learners inside and outside of formal learning spaces' (Moore et al., 2007, p. 51). But in a survey conducted by Hartman, Moskal, and Dziuba (2005), no mention of technology was found in the top-scoring responses about what makes an excellent teacher.

Students' reliance on technology in their everyday lives is well noted in the literature. For example, when one thousand students were deprived of their mobile phones and other devices for twenty four hours, 80 per cent suffered significant distress (Moeller, 2011). Although the majority of students regard technology as both stimulating and appropriate in higher education (Gikas & Grant, 2013), there is no 'typical' student when it comes to e-learning (Graham, 2012). Usage varies widely because of differences in motivation, and access can be limited by a multiplicity of constraints. According to Conole, de Laat, Dillon, and Darby (2008), students tend to resist using university-owned technology, preferring instead to appropriate their own devices to meet their perceived individual learning needs. This increasingly includes access to social media (Davis, Deil-Amen, Rios-Aguilar, and Gonzalez Canche, 2012; Fenwick, 2014; Rowe, 2014).

Many studies prompt universities to give careful consideration to the changing needs of student bodies that, according to Bates and Kaye (2014), require a wider range of attributes upon graduation, including newly emerging employability skills (Nunan et al., 2000). Teaching environments in higher education are central to the facilitation of students' differing learning styles:

'With the increasingly diverse student body and fast socio-economic changes affecting every aspect of life, including the way we teach and learn, there is a growing need to provide spaces that satisfy various needs, accommodate different learning styles, influence students' attention, motivation to learn, and their way of thinking.' (Jankowska & Atlay, 2008, p276).

As degree programmes come to rely more and more on e-learning and new e-pedagogies, support within universities is increasingly focused on computer and information literacy (Nunan, George, & Causland, 2000). Technology, however, is not a panacea: although the Joint Information Systems Committee (2006) acknowledges that the use of technology has the potential to increase the variety and adaptability of what institutions offer, it also warns that it does not guarantee high-quality teaching or learning. In response to the changing needs of its student body, one UK institution recently introduced a flexible teaching space in which staff could experiment with novel teaching ideas and activities that utilized new technologies (King, Joy, Foss, Sinclair, & Sitthiworachart, 2014). Annan (2008) notes that one of the major barriers to the free flow of ideas from academic staff is concern about the lack of support, but King et el. (2014) report that the flexible space and multiple technologies allowed lecturers (supported by a dedicated team of technicians and advisers) to engage with students in ground-breaking ways.

Here we report evidence collected via an extended consultation with staff and students in the large engineering-based department of a major UK university. Like most institutions of its kind, the university had recently invested heavily in capital projects and was in the process of designing and building new estate. We sought to uncover the views and experiences of the buildings' key users – staff and students - and to explore more closely some of the pedagogical issues identified through our literature review.

Methods and Data

We selected a Russell Group university because of the group's close association with high capital expenditure (BiGGAR Economics, 2014) and chose an engineering-based department within this university because it was in receipt of substantial ongoing investment. We created a survey to capture students' views about building design, receiving a total of 212 responses. We also undertook a group session with 60 second-year undergraduate students, where questions were presented verbally and projected on-screen, and responses to some questions captured in real time via mobile phones or 'clickers'. All the students were invited to take part in follow-up focus group discussions and a small financial incentive was offered to encourage participation. In total, four discussions were held with students: 27 were undergraduates (fifteen in their first year, seven in their second year and five in their fourth year) and one was a postgraduate student.

To target university staff, we asked the Head of School to identify colleagues that would be most directly affected by the capital investment project. Participation was voluntary but all those invited agreed to take part. Interviews were conducted with ten members of academic

and support staff, each lasting 45-60 minutes. Data from focus groups and interviews were analysed thematically, and, as the next section explains, three recurrent themes emerged.

Thematic Analysis

The question of whether 'unpretentious, cheap buildings could satisfy users as well as flashier estates' has been asked directly by Marmot (2015) and less directly by others (Brown, 2005; Graham, 2012). When we surveyed our student participants to find out how their learning experience could be improved, building design emerged as a low priority (Figure 1), with only 4.7% of students saying it would most enhance their experience. This finding is consistent with a recent survey that took the reverse approach, asking students in which ways universities' expenses might be reduced: 45% of respondents suggested spending less money on buildings (Buckley et. al., 2015).
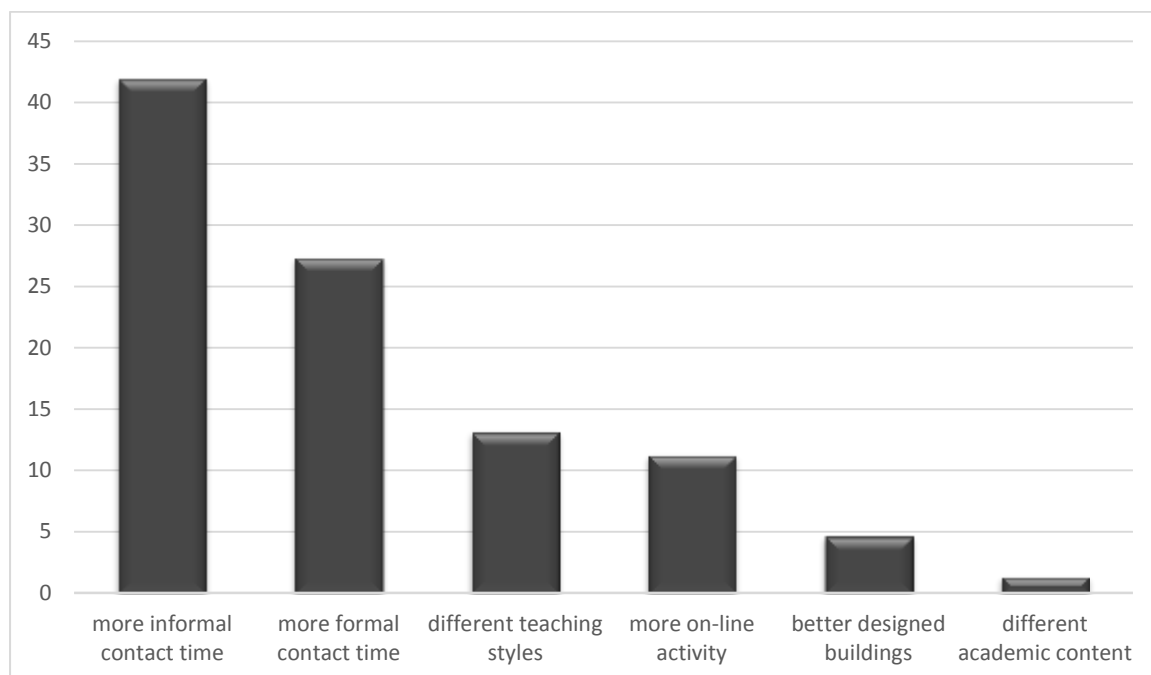
Figure 1: Responses to "What would improve your learning experience most?"(per cent distribution; n = 212)

The benefits of newer and better designed buildings stretch far beyond the augmentation of students' learning experience: they act as an important marketing tool; they provide a context conducive to outstanding research; they offer a secure and safe environment for their users. However, building design ranks only fifth of the six options offered, an outcome that appears disproportionate to recent levels of expenditure in the UK and elsewhere. This finding is not necessarily inconsistent with research from the Higher Education Design Quality Forum (2013), which found that when deciding on which university to study at, over a third of students rejected certain institutions because of their buildings, facilities and physical environment. Rather, it indicates that the buildings which attracted students (or, at least, did not put them off) are not seen to be delivering their full pedagogical potential. To understand students' responses more fully, and to contextualise Figure 1 in relation to the views of

university staff, we draw on thematic analysis of the data collected through small focus groups and individual interviews. We structure our analysis around three recurring themes that emerged in response to questions about what university buildings can most valuably contribute to students' learning: (a) fostering cohort identity and maximising interaction; (b) facilitating a balanced curriculum and learner-appropriate pedagogy; and (c) smoothing school-to-university transition.

Fostering cohort identity and maximising interaction

The importance of 'fitting in' at university is well documented in the literature (Reay, Crozier, & Clayton, 2010) and our respondents were consistent in terms of how university buildings should be planned to maximise a sense of belonging. All sought to minimise time travelling across the campus ('you have to go to the far ends of the earth to teach something,' complained one staff member) and preferred buildings that were large enough to accommodate all of the teaching and learning needs for particular discipline-level cohorts ('we need to plan the logistics sensibly'). This was felt to be particularly important in terms of generating cohort identity, as one staff member noted:

> 'It's quite a cohesive group, we're a bit incestuous, a little bit silo-ish – but there's huge strengths in that, as well – we do a lot of co-supervision, cross-supervision and a lot of idea sharing and my students can always go to my neighbour next door or two doors down or whatever to get a bit of technical input or some optimisation specialist input or that kind of thing. So, we like being in a little cluster, we like talking to each other and we like our students knowing each other's students.'

Internally, positioning informal space and meeting rooms near to staff offices was considered vital by all interviewees. Communal spaces were felt to be at the heart of the teaching environment. Access was an issue, with one staff member noting 'any place that two hundred students have to get to shouldn't be up three or four flights of stairs.' Similarly, the size of teaching groups was a recurring theme in the data. One staff member talked about 'incredible congestion' while another noted that 'you have to squeeze in where you can squeeze in'.

A key driver for building design is often the potential for changes to pedagogy that enable more personalised learning and less lecturer-driven instruction. 'More individual interaction is what I'd be looking for,' said one staff member, 'we need facilities that allow us to do that.' Some students acknowledged that peer-to-peer learning, if properly orchestrated and guided, was useful both as a learning strategy and to develop cohort identity: 'to be honest [peer learning] does work a lot of the time - sometimes I go round to other tables and ask them how they did it and they usually help'. However, when asked to name the main way in which they use technology at university, only 6 per cent of our students participants responded with "to learn by engaging with other students" (compared to the 66 per cent who responded with "to access content for my units" and the 28 per cent who responded with "to prepare for assessment"). Many staff members noted that building design did not always maximise staff-student engagement: 'I don't know all my students and I wouldn't recognise half of them in my class, and that's sad really - I'd like to know them all.'

When probed about the kind of facilities that would allow better relations, the general response was that podcasts and instructional videos that would free up in-class time to discuss and develop ideas at a higher level and enable more personalised interaction. For staff, the perception of peer-to-peer interaction was generally positive:

> 'I often think that they get more out of being proximate to each other than they do from, say, getting supervision from me. If somebody needs to know some tricky thing about using a particular piece of software, they talk to so and so, they talk to each other.'

For students, some positivity was identifiable ('there's a place for us to talk to each other now – that's always good') but also caution. One student framed peer-to-peer learning as the difference between 'not knowing what to do on your own and not knowing what to do with your mate.'

Facilitating a balanced curriculum and learner-appropriate pedagogy

Buildings have the potential to change what goes on inside a university (Temple, 2007), and greater capital investment has coincided not only with a different look to campuses but also with the development of different learning cultures and techniques. For example, social learning spaces are now a frequent feature of university buildings, and only 5 per cent of the students we surveyed felt that they were not conducive to accelerated learning. Staff members were aware of the negatives ('noisy'; 'lots of distractions'), but positive about their cohesive potential ('one of the things that makes a department'). A minority of staff members questioned the value of social spaces on the grounds that they were too busy to join them. 'I don't even take a lunch break, let alone go and mingle,' said one. A note of caution was also sounded about flexible teaching spaces by one staff member, who said:

> 'I always have concerns over what we call flexible space because if you're not careful, flexible actually means it doesn't have any function and doesn't do anything particularly well. If you're going to have space that you can use, then there needs to be enough of it or it needs to function in such a way that it's always available.'

Frustration was expressed about the practicalities of using larger teaching spaces: 'if I wanted to teach the whole class, realistically I'd just have to shout from one end of the room'. Mixed views were also expressed about the traditional lecture theatre. For one staff member, 'there's everything I need, which is basically PowerPoint, all the audio video stuff, the visualiser, the ability to control everything - that all works fine.' Some students agreed ('I don't need everything all hi-tech all the time') but others complained about 'some lecturers just talking at you for the whole hour'. A recurring theme in the interviews with staff members is captured by the remark about 'the ability to control everything'. Concerns were repeatedly raised about having technology but not having the skills and/or support to exploit it fully.

One argument made by some teaching staff was that peer-to-peer interaction is so readily available on-line that universities should not assume it is their job to facilitate it further in class. One spoke of an on-line discussion forum in terms of its peer-to-peer learning

potential: 'the advantage of those sorts of things is that the students can help each other.' Another staff member explained 'I just have to answer one thread rather than fifty emails from people who all have the same problem'.

As in previous studies (Conole et al., 2008), most students expressed a strong preference for using their own device. However, specialist software is not always licensed for non-university computers. Staff commented on students' levels of comfort with digital technologies, noting that 'text based interactions are totally normal.' One reported that many students no longer used paper at all, explaining that 'they've got all the notes electronically on a tablet or even on a smart phone and few of them even have think pads where you can fold them over and it's electronic paper.' Such developments question whether staples of university estates, like photocopying rooms and stationery cupboards, are still required.

However, some concern was expressed by staff about the potential damaging effects of technology on student community. One noted that 'it's much easier [for students] to become atomised and much more isolated because frankly, why get out of bed when you can just do a podcast later in your PJs?' Other colleagues noted that some features of newer university buildings and their related pedagogies rely heavily on assumptions that students were sufficiently autonomous learners. One was sceptical 'because it takes a kind of maturity and independence that we're not currently expecting in undergraduates'. However, in general, there was an acceptance that technology opens up more possibilities in higher education than it presents problems. What both staff and students wanted was a curriculum that seamlessly blended different learning types according to the pedagogical needs being addressed, without privileging any particular mode of delivery over another. The challenge is to create buildings that not only provide this flexibility but also offer students and staff the structured support and guidance needed to use learning spaces optimally.

Smoothing school-to-university transition

The final issue that emerged from thematic analysis of the data involved the role that university buildings play in students' transition from pre-18 schooling to higher education. The design of campus estates appears to play an important role in this transition, as the academic environment is perceived to be inextricably linked with academic culture. For a third of the students we surveyed, their university teaching differed from their pre-arrival expectations ("not quite as I thought it would be" - 28 per cent; "totally different" - 5 per cent). Students attributed the mismatch to insufficient support from staff and to teaching groups that were larger than previously encountered. However, many also made direct connections with their higher education environment ('I knew it'd be big, and sometimes it's *good* big, but then other times you're just, whoa, you're just overwhelmed').

Students knew that they needed to become independent learners, and that the more quickly this could happen, the more advantageous it would be to their academic progress. Many struggled to understand their relationship with teaching staff and did not find their university building as conducive as school to forming appropriate networks. Many commented that university estates were visually impressive ('all nice and shiny'), but reported feeling 'lost' in

their new environment, both literally and metaphorically. Comparisons with previous educational environments were common and rarely favourable: 'in college I knew what everything was *for'*.

Partly, this is indicative of wider transitioning issues, as students struggle to conceptualise the different academic expectations that higher education brings. This theme was picked up from a different perspective in interviews with staff members. One noted that 'I'm not really a teacher, like their teachers were at school, so they don't quite understand that relationship.' And another grumbled 'students should realise you're in university - you're not in school anymore - there is a difference and the tutors have other things to do other than think about you'. However, many staff members were sensitive toward the needs of new learners and aware of the academic gulf that arose. One noted that 'it's very difficult to discriminate in terms of individual need and learning preferences and pace and so on, which is where the podcasts are clearly very attractive'. Indeed, the use of technology was seen as the primary remedy to the problem of having large cohorts comprised of students with different learning needs.

Miscommunication, however, emerged regularly. Perhaps conditioned by years of largely transmission-based instruction, students privilege face-to-face information over on-line material. One staff member talked about students' confusion about independent learning, noting that additional on-line supporting material 'is essentially dismissed [because] if I didn't say it in class, it's not on the syllabus.' Another told us that he emphasised in every lecture that he was available for drop-in sessions, but that students did not attend. 'I have very little sympathy for people that don't take up the help that's on offer,' he said. Conversely, students reported anxieties about approaching academic staff whom they perceived to be busy with research ('the door's usually shut and you don't know whether you're important enough to interrupt') and many expressed a preference for more open plan environments and the pro-active approach taken by their schoolteachers and college tutors.

Discussion

Clearly, it is important for any university to offer "comfortable, welcoming spaces that can be used in a variety of ways and adapted to new uses at reasonable cost" (Temple, 2007, p. 8). However, as many studies of higher education architecture imply, "the boxed-in classroom still rules; it remains *the* hold-all for things pedagogical, with everything and everyone in its fixed and immutable place" (McWilliam, Sweet, & Blythe, 2013, p. 3). The evidence presented here confirms that opportunities are being missed, and that many users are under-appreciating and under-utilising their university building space. For example, one student reported using her smartphone to take a photograph of the notes made on a white board, while another used his laptop to video record PowerPoint slides because of difficulties accessing the on-line spaces in which they were purportedly deposited. Many staff also felt that their buildings did not meet their immediate teaching needs. For example, editing rooms were said to be required so that taught material could be quickly captured and formatted in ways that allow students to digest information electronically ('a video suite basically, but one that doesn't require you to actually know what you're doing'). Similarly, while most primary

and secondary schools have interactive smart boards in every classroom, higher education was felt to lag behind. In terms of engagement with technology, one staff member noted, 'you've got to get them into the habit of actually using the resources that are available to them'. But for students, accustomed to more instructive styles of teaching and often lacking the independent skills needed for self-guided learning, such behaviours can prove difficult to acquire. Clearer, more thoughtful pedagogy was prioritised over newer buildings; small-group contact, chance encounters and casual conversations were prized over any specific type of learning space. In this way, university building design presents an opportunity to bring staff out of their traditional habitat and into spaces that allow their contact with students to be less intermittent, less formalised and therefore less daunting.

Most students brought their own devices to class and were ready to use them to engage with on-line platforms (Gikas & Grant, 2013). Institutionally-owned technology was disfavoured, with students preferring to select and appropriate technologies that best meet their own personal learning needs (Conole et al., 2008). Reliable, powerful Wi-Fi remains the safest way to 'future-proof' any university building (Cheever, Rosen, Carrier, & Chavez, 2014). However, sensitivity is needed toward the socio-economic factors that enable or limit engagement, and a distinction needed between students' social use of technology and that appropriate for education (Dabbagh & Kitsantas, 2012; Davis et al., 2012).

Though there are advantages to having rooms that serve multiple functions (e.g. teaching spaces that can be used as a computer hub), students expressed a strong desire to be able to 'colonise' space and make it their own. Many of our respondents advocated corridors that were spacious and well lit, with communal seating areas so that pre- and post-session interaction is not only enabled but encouraged. Water coolers, and other features associated with workplace environments, were endorsed as a means to facilitate conversations. Harrop and Turpin's (2013) list of nine learning space attributes include many of the themes considered important by respondents in this study – community, identity, resources, etc. – but we finds less evidence that "a portfolio of interrelated campus spaces" (Harrop & Turpin, 2013, p.72) is optimal. Rather, our participants sought to colonise smaller, local environments and often dismissed the wider architecture of the campus as an institutional marketing tool.

Transitioning remains a particular area of concern (Reay et al., 2010). Many of the staff members we interviewed expressed frustration at students' adjustment to higher education ('what we are doing, to a certain extent is making university more like high school'), but students felt no less exasperated at having an expensive learning environment without knowing how to make full use of it ('some of the places they say are meant for us, I've never even been to'). Communal space was deemed important, but carefully guided learning is needed for students to make the most of it.

Buckley et al. refer to "an arms race" (2015, p. 37) in which UK institutions have vied in terms of capital expenditure without necessarily addressing the priorities of their users. We find evidence of students waiting to be coached on how to exploit their new learning spaces while universities sit back, confident that their lavish capital expenditure programmes are delivering the best possible experience. Greater consultation has the potential to pre-empt

many occupancy problems, and methodologies for conducting post-occupancy evaluations, such as the Higher Education Design Quality Forum (2013), are available. Our findings suggest that capital expenditure is better viewed as an ongoing driver of pedagogical advancement than as a project completed when the final brick is laid.

Conclusion

University buildings alone do not improve university teaching (Joint Information Systems Committee, 2006), and the extent to which their design augments students' learning experience cannot be easily separated from other academic and contextual factors (Temple, 2014). What estate developments offer is the opportunity to revisit and, where appropriate, disrupt established pedagogical practices. As students move closer to technology in their social and personal lives, so space opens up for higher education to evolve in ways that align with learners' other digital behaviours.

Efficiency gains have clearly been a driver of capital expenditure. It is claimed that without new buildings, universities would have needed to increase their size by an additional 10 per cent in 2012/13 (Associate of University Directors of Estates, 2015, p. 28). But in the marketised context of UK higher education, fee-paying students rightly demand more than institutional savings. They expect the buildings to maximise their learning opportunities and create the optimal environments for their safety, interaction and personal development. Whether the learning gains amassed from accelerated capital expenditure are proportionate to the costs incurred is difficult to measure. Our research shows that students' first instinct is not to conceptualise their university buildings as a significant influence on their learning; indeed, modern estates are not always the magnet for students that some assume ("I always thought that the buildings were quite ancient and that's one of the reasons which influenced me to study here"). But the higher education environment that students do reportedly want – one that facilitates different forms of staff-student contact, more widely and more casually – is one that can be expedited through new estates.

All university buildings – the new and the old, in the UK and elsewhere – need to respond to their users' evolving requirements (Marmot, 2015), and we take no more than a first step toward evaluating how this process takes place. Further research into 'bigger picture' issues, such as the changing face of pedagogy in higher education, and the lecturer's role as designer-facilitator rather than transmitter-instructor, is required. As the sector becomes more experiential, the challenge for university staff will be to equip their students with independent, critical thinking skills. The challenge for university leaders will be to ensure that the substantial investment in capital expenditure pays off not only in glossy brochures targeting fee-paying applicants, but also in leveraging ground-level pedagogical gains for both staff and students.

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