E-LEARNING SPACES AND THE DIGITAL UNIVERSITY: WHERE THE PHYSICAL MEETS THE DIGITAL

Dominic Pates and Neal Sumner
City University London
London, UK

Abstract

How do we realise the potential of flexible learning spaces in the digital university? What skills and literacies will help users to take maximum advantage of the digitally-enhanced learning space? Drawing from lessons learned and work in progress, we explore City University London's policies and initiatives in rethinking and redesigning several physical classroom environments. Through an examination of a number of institutional initiatives and the current work of the Learning Spaces team, this paper highlights the need for the development of digital literacies among academic staff and students in order to realise the potential of technology-enhanced active learning spaces.

Introduction

Higher education in the developed world is arguably undergoing one of the most profoundly turbulent set of challenges in living memory. Global economic, technological and pedagogical currents are interweaving to produce paradigmatic changes that challenge many of the traditional practices and environments of higher education institutions (HEIs). A discourse concerning the extent to which HEIs are being disrupted by the impact of these developments has now become well-established (Christensen, n.d.).

> Education is the key quality of labour; the new producers of informational capitalism are those knowledge generators and information processors whose contribution is most valuable to the firm, the region and the national economy. (Castells, 1996, p.18)

Building on the notion asserted by Castells of the contemporary importance of education, there is a growing recognition amongst nation states in the developed world that graduate-level skills and knowledge are increasingly needed to drive the 21st Century knowledge economy. One direct consequence of this recognition has been the drive towards the massification of higher education. In the UK, for example, the longstanding state ambition to have 50% of 18-24 year olds in HE has almost been met (Adams, 2013). This vast increase in the sheer number of students puts significant pressure on the existing infrastructure of HEIs. It has also happened largely in parallel with a dramatic rise in the level of tuition fees that HEIs can charge. The UK has seen an eightfold rise from £1,000 per annum in 1998 to up to £9,000 per annum in 2012. Although the full impact of these changes have yet to work through the system, there appears to be a shift taking place in the attitudes of students who, in some ways, are now positioned as consumers rather than scholars of higher education.

A further development, which challenges the conventional role of HEIs as exclusive knowledge providers, is the explosion of open educational resources available across the Web and the increasing accessibility of the online classroom (Bates, 2015). An example of this is the recent rapid growth in MOOCs that has occurred since 2009. These developments serve to decentre the pivotal role of the traditional academic as a *sage on stage*, since students are now able to easily access a world of knowledge on their own digital devices unavailable to previous generations of learners.

HEIs face rising student expectations, which can include greater personalisation of their study experience, a reliable technological infrastructure, digitally literate staff, and support for developing their own digital literacies (JISC, 2015). These factors collectively contribute to a shifting dynamic between learners in HE and their institutions, which is in part reflected in the emergence of new models of learning and teaching. One example is a growing understanding that the traditional lecture, based as it is on a largely transmissive and behaviourist model of instruction, is an ineffective method of knowledge construction and does not meet the needs of today's learners to prepare them for the modern workplace (Cuseo, 2007; Kaddoura, 2011; Fukawa-Connelly, 2012; Broadwater, 2013; Severiens, Meeuwisse, & Born, 2015). Whilst such a view of the effectiveness of lecture-based instruction is not new in itself (Pulliam, 1963), more recent responses from the educational development community have been to promote more active and collaborative forms of learning. This is based on constructivist pedagogies and invariably supported through appropriate use of educational technologies. The current trend towards the flipped classroom is an example of such a constructivist-aligned, technology-enhanced approach.

This paper serves to illustrate one way in which a British HEI, City University London (City), is facing up to these challenges via an extensive programme of redevelopment, reconfiguration and refreshment of several of its formal learning spaces that has followed on from significant research, experimentation and evaluation around the rethinking of the HE learning space. This programme includes a rebuilding of parts of its estate and a major development of existing digital infrastructure coupled with a strong focus on staff development, including efforts to provide staff with the knowledge and skills to realise the potential of the digitally-enhanced classroom.

Principles Underpinning Developing Learning Spaces

Over the last 40 years, there has been a gradual shift in the pedagogic models that underpin the delivery of teaching and learning practices in developed world HEIs. The traditional lecture theatre design, relatively unchanged for centuries, has been shaped by a broadly transmissive approach. This was reflective of a period when access to knowledge was restricted, expensive and often shaped by the scarcity of resources (Beichner, 2014; Bates, 2015). However, in recent decades, there has been a significant shift in our understanding of what constitutes effective pedagogies. There is now a broad acceptance (Fry, Ketteridge, & Marshall, 2014) that constructivist and social constructivist approaches can be more effective in terms of enabling student learning. Coterminous with this development, the emergence of the Internet

and then the Web have transformed the availability and accessibility of information and therefore traditional practices on which university curricula are based.

The three trends identified here – contemporary massification, which has further distanced the relationship between the lecturer and student and often results in a reduction in face-to-face contact time, the pedagogic shift from a conventional transmissive approach to a recognition of the effectiveness of the constructivist approach, and the growing influence of digital technologies on teaching and learning – combine to challenge how physical learning spaces suited to the 21st century campus are designed.

So, how far do the traditional tiered lecture theatre and conventional seminar rooms with their serried ranks of inflexible furniture meet the new demands that are indicated above? Over the past 20 years, HEIs in Australia, the US and the UK have attempted to answer this question through the redevelopment of their existing spaces, the design and creation of entirely new digitally-enhanced active learning spaces, and the provision of experimental 'sandbox' environments for the exploration of new possibilities in teaching and learning within HE. Renowned examples range from the collaborative, circular-tabled large capacity classrooms of North Carolina State University's SCALE-UP project in the mid-1990s (Beichner, 2014) and MIT's Technology Enhanced Active Learning (TEAL) environments (Rimer, 2009), to the swivel-seated lecture space of Iowa State University's LeBaron Hall Auditorium (Twetten, 2006) and Loughborough Design School's lecture theatre with its modular sofa-seating (Peberdy, 2014).

Changes in the physical environment within some of these HE learning spaces have included the provision of more flexible furniture, which facilitate the reconfiguration of the teaching and learning space in multiple ways, expanded writing surfaces, the decentring of the teaching podium as the sole focus of the direction of attention, an expansion in the availability of power sockets, and ubiquitous wifi connectivity. This period has also seen the impact of a wide range of digital technologies into lecture theatres and seminar rooms. In some spaces, students have access to a wider range of better-positioned display screens and the provision of electronic voting systems. Many students will also bring the expectation of wireless connectivity and the opportunity to charge their own devices in these spaces.

The academic toolkit can now include web-enabled teaching podiums that consist of desktop PCs, touch panel controllers, audio-visual projection including visualisers, inputs for own devices, and interactive screens, as well as whiteboard capture technologies, and, increasingly, lecture capture capabilities. Enabling faculty to make effective use of these technologies in the classroom is one of the major challenges facing the educational development community.

What follows is an exploration of some of the ways in which City has responded to these challenges. This will cover an examination of the overarching policy framework, examples of completed projects, reference to

the stakeholder interests that have driven these changes, and an outline of current projects and practices developed by the Learning Spaces theme team within the Learning Enhancement and Development department (LEaD).

New Learning Spaces at City

City currently has 101 multipurpose, non-specialised teaching rooms across the institution that can be utilised by different schools for timetabled classes. These rooms are where a significant amount of teaching and learning takes place across the institution and run alongside other spaces specifically set aside for individual schools or for specialised teaching requirements and other spaces for students and academic staff such as dedicated computer and meeting rooms. At the time of writing (Spring 2015), a total of 45 of these multipurpose rooms, described as *flexible learning spaces*, have been launched over the last five years. These are defined by City as "rooms… which have flexible furniture to support group-based learning and discussions" (Flexible Learning Spaces, nd). At 45% of all multipurpose learning spaces, this amounts to a significant institutional and financial investment in the perceived benefits of providing flexibility in a learning space for fostering a broad range of models of teaching and learning. This estate redevelopment is part of City's Vision for 2016, which strives to establish City amongst the top 2% of global universities (Building the Vision, nd).

An early indicator of rethinking of learning space provision at City can be traced to the renaming of the Classroom Experience Steering Group, largely comprised of IT staff, to the Learning Spaces Group, a collective which also included students, academics from different disciplines and other senior Professional Services members such as Properties and Facilties (PAF) and Information Services, alongside educational technologist staff (Bowdler, 2011). Amongst other considerations, this group was tasked with reviewing under-utilised rooms across campus, leading to a number of key initiatives in investigating experimental and flexible spaces. One new room was characterised by multi-height furniture, which was designed to explore creating natural groups within the space. Two others were developed as alternatives to traditional computer rooms. These were to incorporate both lecturing and student computer work, and were driven by a requirement to support a curriculum designed around problem-based learning (Bullimore, Reader, & Sultany, 2013). They comprised of a room with pop-up computers on circular tables and a room that included a new form of tablet chair (known as a *node chair*), supported by a laptop locker in an adjacent room that enabled easy access to mobile devices in support of the learning activities. Other node chair room experiments were also conducted, including one where a flexible room set-up with node chairs, extended writing surfaces and a teaching pod was augmented with an iPad Cart, a mobile multi-tablet storage and syncing device (Reader, Pamplin, Cancienne, & Solkin, 2013). This environment enabled staff to develop more active learning approaches in their teaching, therefore creating new opportunities for learning not available with previous room configurations.

Further influences on City's Learning Spaces project came from papers by Fisher (2005a, 2005b) and Cuseo (2007), and an extensive review of learning spaces literature (Pamplin, 2013). Chickering and Gameson's (1987) principles for undergraduate education good practices were mapped to learning space configurations to produce a set of Guiding Design Principles (Cancienne, 2013a).

These research and evaluation efforts and stakeholder discussions were amongst the major contributory inputs that culminated in the creation of a Learning Spaces Manifesto:

> Our learning spaces will be bright, inviting agile spaces, able to accommodate the full breadth of teaching and learning approaches. Students and lecturers will be able to communicate with one another easily, and share and develop ideas between themselves in these spaces. Our spaces will communicate the pride we have in our learning, and help engage students in the university academic community through being world class spaces that meet their learning needs. (Cancienne, 2013b)

This statement has framed the ongoing and extensive redevelopment of City's stock of formal and informal learning spaces.

Campus development projects such as these inevitably draw out differing perceptions of what the primary educational drivers are, determined by the position of the interested stakeholder. For example, the further scaling-up in size of the student body may seem to demand ever larger lecture theatres that in turn support the continuation of transmissive modes of teaching. Greater room flexibility, however, may require an increase in the availability of actual empty space. The involvement of City's Education Committee in approving flexible seating in new lecture spaces (Cancienne, 2013c) is an example of where the issue of academic quality of space prevailed over timetabling needs. Two other groups with typically differing perceptions of educational requirements – students and the University executive – engaged with each other via a Student Community Working Group paper for Senate as a part of this process (Cancienne, 2013b)

Further operational decisions and ideas around City's new learning spaces were explored within the forum of the Learning Spaces Group, which acted in an advisory capacity to various other committees that granted permissions in developing additional spaces, and which included heads of PAF, Associate Deans of Education, the Pro-Vice Chancellor and senior LEaD staff.

City's Learning Spaces Team

In 2014, a new Learning Spaces-themed team of dedicated educational technologists was created within LEaD. This team was tasked with running a focused programme of staff development in order to realise genuine educational change by enabling academic staff to make optimum use of the new learning spaces. The team remit includes raising awareness amongst faculty of the potential of these new spaces, encouraging or supporting them

in the adoption of more interactive and collaborative practices in their teaching, working on the integration of digital technologies in the face-to-face classroom, and contributing to the design and development of new and additional formal learning spaces, including via the engagement of faculty in the design process. These multi-faceted approaches for reaching and engaging the academic staff within the institution can be largely grouped into the following areas – staff development, communications, and research and evaluation. A brief indication of how this engagement is being driven is outlined here.

Staff development work includes generic and bespoke group training sessions and workshops, and acting in advisory capacities for individual academics on curriculum enhancement ideas. Workshops have covered sessions on core technologies, such as lecture capture or in-class use of the web-based BYOD (Bring Your Own Device) voting tool Poll Everywhere, as well as termly sessions for all academics looking at approaches for large or small group teaching within these spaces, or for extending classroom teaching through multimedia tools. Communications activities have so far included email and poster campaigns, sections on learning spaces within e-newsletters, posts on the main LEaD blog (http://bit.ly/CityLS) and a short film (https://www.youtube.com/watch?v=sAVtiuHCfCM) produced in collaboration with LEaD's Multimedia team to promote the range of new rooms and their affordances to academic staff.

Research and evaluation activities have built on the work completed before the theme came together and have included evaluations of new rooms and supported technologies, as well as horizon scanning investigations into technologies yet to be deployed but which could potentially provide further enhancements to the teaching and learning experience. Here are some examples of work conducted in these areas.

An extensive mixed methods investigation (Kogan, Ntonia, & Smith, 2015) into staff and student perceptions of City's physical learning spaces (flexible or otherwise) concluded that many institutional learning spaces have an overall positive impact on user stakeholders and also identified areas for improvement. This has fed into further research currently underway, in areas such as wireless projection and whiteboard capture. Conference participation and engagement with other HEIs have brought in new good practice ideas for lecture capture, with an evaluation of the impact of lecture capture usage at City due in the next academic year. A literature review into best practices for evaluating learning spaces (Pates, 2014) identified additional frameworks such as Radcliffe, Wilson, Powell, and Tibbetts'Pedagogy-Space-Technology (PST) framework (2009) to help guide and inform ongoing and future room evaluations.

Developing Staff and Student Digital Literacies

The NMC Horizon Reports (Higher Education editions) have described digital media literacies amongst staff and students as a significant or even critical challenge that is impeding the adoption of such technologies in higher education. The 2010 edition (Johnson, Levine, Smith, & Stone) proposed that

"digital literacy must necessarily be less about tools and more about ways of thinking and seeing" (p 5). In the most recent edition (Johnson, Adams Becker, Estrada, & Freeman, 2015), the indication was that HEIs have now recognised that faculty need to be better equipped in order for digital literacies to be instilled in their students, but that there remains an absence of consensus as to what digital literacy comprises. The two examples that follow relate to the digital technologies used at City in face-to-face teaching for enhancing the learning experience, rather than the use of distance or asynchronous tools such as blogs or online forums.

An academic wishing to use a tool such as an Poll Everywhere with a 'live class' may face additional performance pressures that extend beyond how to build and configure polls or that are not present in the use of asynchronous teaching tools. Effective incorporation into a lecture can also require imagining the range of mobile devices that students may (or may not) bring to the lecture, knowing that what will be displayed on the screens of student devices will differ from what is displayed on the main room projector, as well as the actual live operation of the poll. LEaD provides one-off training and ongoing support for individuals or groups of academics wishing to investigate this particular tool, ensuring a focus on the challenges of using mobile devices for learning and differences between using these and dedicated 'clickers' for in-class voting.

The addition of video-based lecture capture to City's learning spaces (currently available in 51 teaching spaces at City) is another recent challenge for educational technology staff, who help academics balance fast and easy solutions for capturing a lecture with considering further activities that may take additional time but which can extend teaching or add further educational richness. While the recordings are automated, the output can be enhanced by tagging and/or adding chapters to the recording. As ever, there are both development and pedagogic questions to consider, both for the educational technologist and the academic.

Beetham (2014) suggested, that "the confidence of teaching staff has a strong impact on students' satisfaction with the use of technology," but that, despite rising expectations, many students are "still unclear about how the technologies they use at university can help them to succeed." It follows that universities should consider the digital skills of their students and recognise that there will be a breadth of skills and expectations within that diverse student group. While providing support for developing students' digital literacies goes beyond the remit of City's educational technologists, encouraging faculty to make such considerations in their teaching and assisting staff with their own development makes some contribution towards student literacies.

Conclusion

City has now amassed significant experience in researching, developing, implementing and supporting flexible and innovative HE learning spaces at an institution-wide scale. This has included experimenting iteratively, conducting extensive and broad ranging research and evaluation, actively involving

multiple stakeholders in the process, and incorporating a varied programme of staff development. Drawing on innovative work from HEIs in the US, UK and Australia has informed City's discussions as to what constitutes effective contemporary learning spaces, as have visits to sector leaders in this area and inviting pioneering thinkers to contribute to the evolving vision. These have collectively provided evidence for many of the learning space innovations developed at City in tandem with research conducted within the institution. The existence of a multistakeholder specialist group as forum has fed in to senior decision makers, and has therefore been instrumental in driving the changes from both operational and strategic levels. Making the best use of the available space under budget restraints, balancing pedagogic needs with the pressures of massification, and sourcing and supporting appropriate in-class technologies have all shaped how City has responded to the need for upgrading our learning spaces. Staff development initiatives, including workshops for promoting and sharing good practice, the provision of resources for teaching activities within these spaces, and help with the use of in-class technologies, have built on the successful implementation of institution-wide flexible learning spaces.

These are all steps along the route to realisation of the full potential of flexible learning spaces that City has taken. It is the authors' hope that these experiences will be helpful to other individuals and institutions engaged in promoting the effective use of learning spaces in the digital university.

References

Adams, R. (2013, April 24). Number of students going on to higher education almost reaches 50%. *The Guardian*. Retrieved from http://www.theguardian.com/education/ 2013/apr/24/students-higher-education-almost-50-per-cent

Bates, A. (2015). *Teaching in a digital age*. Retrieved from http://opentextbc.ca/teachinginadigitalage/

Beetham, H. (2014, June 23). Students' experiences and expectations of the digital environment. *JISC Blog*. Retrieved 27/04/15 from http://www.jisc.ac.uk/blog/students-experiences-and-expectations-of-the-digital-environment-23-jun-2014

Beichner, R. J. (2014). History and evolution of active learning spaces. *New Directions for Teaching and Learning*, 2014, 9-16.

Bowdler, R. (2011, December 9). A day in the life of a teaching pod. *Educational Vignettes*. Retrieved from https://blogs.city.ac.uk/educationalvignettes/2011/12/09/a-day-in-the-life-of-a-teaching-pod/#.VT3qBK1VhBc

Broadwater, P. (2013). Death of the lecture? *Bucknel Magazine*. Retrieved from https://www.bucknell.edu/x80297.xml

Building the vision. (n.d.). London: City University London. Acessed 27/04/15 at http://www.city.ac.uk/building-the-vision

Bullimore, A., Reader, K., & Sultany, A. (2013). Flexible learning spaces evaluation report. *Learning at City Journal*, *3*(1), 79-91.

Cancienne, A. (2013a). *Guiding design principles: Flexibilty, visibility, vibrancy* (Unpublished document mapping Chickering & Gameson's

"Seven Principles for Good Practice in Undergraduate Education" to learning space design). Accessed 22/04/15.

Cancienne, A. (2013b). *Learning spaces manifesto* (Unpublished manifesto document). London: City University London.

Cancienne, A. (2013c). *Large lecture theatre position statement* (Unpublished position statement0. London: City University London.

Castells, M. (1996). The network society. In Hargreaves, A. (2003). *Teaching in the Knowledge Society*. New York: Teachers College Press.

Chickering, A. W., & Gamson, Z. F. (1987). Seven principles for good practice in undergraduate education. *American Association of Higher Education Bulletin*, *39*(7) 3-7.

Christensen, C. (n.d.). Disruptive innovation. Retrieved 02/04/15 from http://www.claytonchristensen.com/key-concepts/

Cuseo, J. (2007). The empirical case against large class size: Adverse effects on the teaching, learning, and retention of first-year students. *The Journal of Faculty Development*, *21*(1) 5-21.

Fisher, K. (2005a). *Research into identifying effective learning environments.* Paper for OECD/PEB, Evaluating Quality in Educational Facilities (pp. 159-167). Lisbon, Portugal.

Fisher, K. (2005b). *Proposed planning principles*: *Linking pedagogy and space*. Victoria, Australia: Department of Education and Training Victoria University.

Flexible learning spaces. (n.d.). London: City University London. Accessed 26/04/15 at http://www.city.ac.uk/visit/timetabling-rooms/priority-rooms

Fry, H., Ketteridge, S., & Marshall, S. (2014). *A handbook for teaching and learning in higher education: Enhancing academic practice*. London: Routledge.

Fukawa-Connelly, T. P. (2012). A case study of one instructor's lecture-based teaching of proof in abstract algebra: Making sense of her pedagogigcal moves. *Educational Studies in Mathematics*, *81*(3), 325-345.

Hargreaves, A. (2003). *Teaching in the knowledge society*. New York: Teachers College Press.

Holtham, C., & Cancienne, A. (2014), Collective learning spaces: Constraints on pedagogic excellence. In J. Branch, P. Bartholomew, C. Nygaard, & L. Scott-Webber (Eds.), *Learning space design in higher education* (pp.225-240). Faringdon, Oxfordshire: Libri Publishing.

JISC. (2015). Digital students are different (posters). Retrieved from https://drive.google.com/file/d/0B4y3qNoTbFdYd0ttdEx1STVyeDRFOGdvMVhkeWhMdjZYcVBR/view?pli=1 [Accessed 02/04/15].

Johnson, L., Adams Becker, S., Estrada, V., & Freeman, A. (2015). *NMC horizon report: 2015 higher education edition*. Austin, Texas: The New Media Consortium.

Johnson, L., Levine, A., Smith, R., Stone, S. (2010). *The 2010 horizon report: Higher education edition*. Austin, Texas: The New Media Consortium.

Kaddoura, M. A. (2011). Critical thinking skills of nursing students in lecture-based teaching and case-based learning. *International Journal for the Scholarship of Teaching and Learning*, *5*(2).

Kogan, P., Ntonia, I., & Smith, S. (2015). *An evaluation of learning spaces at city university London* (Unpublished report). London: City University London.

Pamplin, M. (2013). Learning spaces in higher education: A literature review (Unpublished literature review). London: City University London.
Pates, D. (2014). Effective practice for the evaluation of learning spaces. (Unpublished literature review). London: City University London.
Peberdy, D. (2014). *Active learning spaces and technology: Advances in higher and further education*. Droitwich Spa: DroitwichNet.
Pulliam, L. (1963). The lecture: Are we reviving discredited teaching methods? *The Phi Delta Kappan*, *44*(8), 382-385.
Radcliffe, D.,Wilson, H., Powell, D., & Tibbetts, B. (Eds.). (2009). *Learning spaces in higher education: Positive outcomes by design. Proceedings of The Next Generation Learning Spaces 2008 Colloquium*. University of Queensland, Brisbane. Brisbane, Australia:University of Queensland and the Australian Learning and Teaching Council, Brisbane. Retrieved from http://www.uq.edu.au/nextgenerationlearningspace/proceedings
Reader, K., Pamplin, M., Cancienne, A., & Solkin, L. (2013, June). *Energizing the classroom: Reconceptulising learning spaces for higher education in the 21st century.* Paper for EDEN Annual Conference 2013. Oslo, Norway.
Rimer, S. (2009, January,13). At M.I.T., large lectures are going the way of the blackboard. *The New York Times*. Retrieved from http://www.nytimes.com/2009/01/13/us/13physics.html?pagewanted=all&_r=0
Severiens, S., Meeuwisse, M., & Born, M. (2015). Student experience and academic success: Comparing a student-centred and a lecture-based course programme. *Higher Education* (in press). doi: 10.1007 / s10734-014-9820-3
Twetten, J. (2006). Iowa State University: LeBaronHall Auditorium. In D. Oblinger (Ed.), *Learning spaces* (Chapter 22). Educause. Retrieved from https://net.educause.edu/ir/library/pdf/P7102cs9.pdf

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Author Details

Dominic Pates
Dominic.Pates.1@city.ac.uk
Neal Sumner
N.Sumner@city.ac.uk