

University learning spaces as socio-material practices: concept, methods, and applications

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Abstract

The context of higher education is rapidly changing due to the digital transition enforced by the COVID-19 pandemic, the emergence of new models of education and the advent of the Fourth Industrial Revolution. In tune with these changes, the conceptualisation of learning spaces as static physical entities is no longer fruitful. This chapter offers a conception of learning spaces as enacted in socio-material practices. The chapter will draw on the design research projects conducted in the LE-DR Lab <https://futurelearningenvironments.org/le-dr-lab/>, where postgraduate architecture students explore different themes on future learning environments in higher education. The projects demonstrate visions of future learning spaces from the students' perspective. The conception of learning spaces as socio-material practices is enacted in the LE-DR Lab projects through tools such as scripts, board games and personas, thus becoming an exploratory space for developing and testing new propositions for university spaces.

The changing context of higher education and its learning spaces

Over the last two decades, we are seeing seismic changes in higher education, which will considerably impact the design, management, and use of learning spaces. During a horizon-scanning project for the Higher Education Design Quality Forum (HEDQF), we found six key research themes (Image 1) that need attention to inform better design, management and use of the university learning spaces (Patel, 2019).

The first theme addressed changing models of higher education and the impact that might have on university learning spaces. During 2021/22, the Open University has more than three times the number of students as any other higher education provider in the UK, with most students studying part-time. In 2020/21, the number of students enrolled at The Open University is 152,245, with 365 students enrolled on full-time study mode (Higher Education Statistics Agency, 2022). Despite having the highest number of students enrolled, the total internal area is significantly less than other universities with higher student numbers. In 2019/20, it was also the largest provider of degree apprenticeships, which is a substantially different education programme than a typical degree programme. Additionally, the university's free online learning platform OpenLearn offers a range of courses for individuals to learn at their convenience. Lousie Casella, The Open University's senior officer in Wales, elaborated in our Blueprints for Tomorrow podcast series that flexibility is a crucial factor for their success and involves turning the university model inside out and going to the learners where they are (Casella and Johns, 2021).

The second theme represented a long-standing matter of concern to engender student-centred learning within higher education pedagogical practice. The idea of student-centred learning is not new. However, applying the concept in practice is challenging. Design and management of learning spaces play an essential role in achieving this endeavour by sharing the ownership of learning spaces with students. Sheffield Hallam University's Flexible Classrooms Developments and Protocols is an exemplar in attempting to put student-centred learning into practice:

"Classroom layouts and arrangements, at some point in the past have led to inflexible, teaching rooms which perpetuate a dependence upon didactic methods amongst teachers and students. ... Clarity over the arrangements for the design and management of flexible classrooms will support and encourage our teachers to more effectively engage our students with their learning in more diverse and student-centred ways." (p.3, Future Learning Spaces Group, 2016)

The protocol stipulates a series of actions, including the default layout of the classroom to be cabaret-style instead of lecture-style rows of desks and chairs, a flexible approach to room allocation to allow for more space to adapt the furniture layouts and the development of digital infrastructure to enable projecting and sharing of digital outputs by students and tutors.

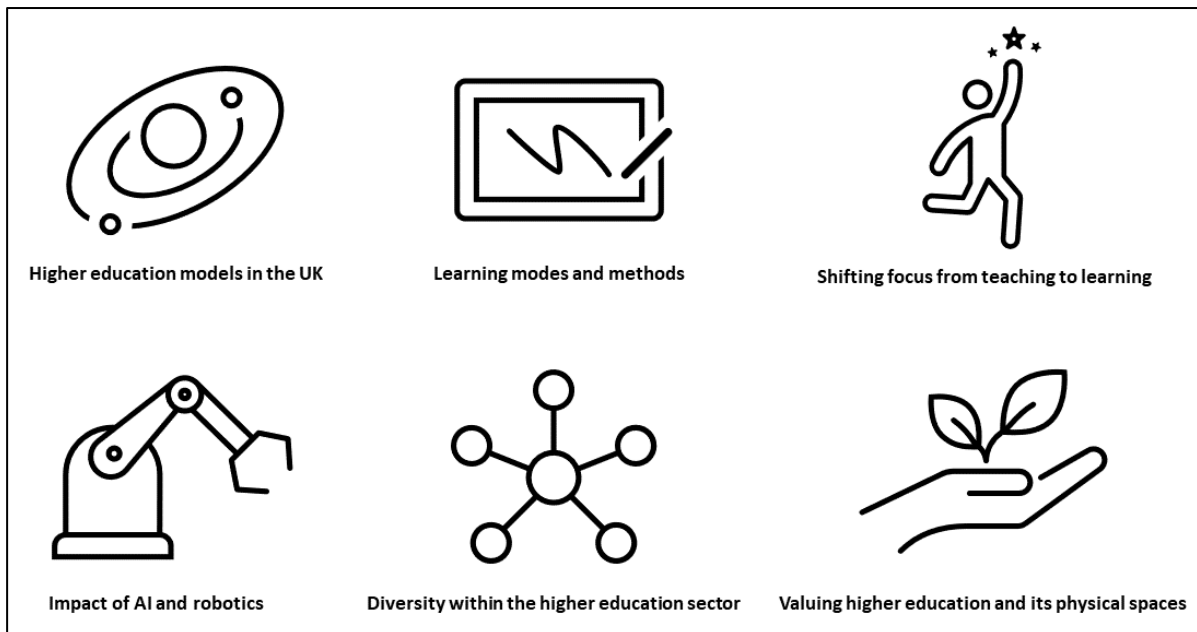


Image 1 Themes that require further research to inform design, management, and use of university learning spaces. Developed from Patel (2019)

The third theme focused on students' learning journeys that are not restricted to timetabled classroom sessions, covering various activities and places where learning happens. The impact of working from home during COVID-19 has provided an impetus to the idea of spatial ecosystems that support different activities (cf. Katsikakis et al., 2020). Within the learning environments field, Nordquist and Laing (2015) proposed the idea of 'The Networked Learning Landscape Model' to connect physical learning spaces at different scales with different levels of permeability in the digital realm. However, applying such a concept requires capabilities, processes and tools to achieve integration between different layers and scales of physical and virtual environments (Nordquist et al., 2016). A recent survey of capabilities within the higher education sector to achieve alignment between learning and space found that substantial work is needed in this area (Patel, 2022).

The fourth theme is concerned with the impact of artificial intelligence and robotics on higher education curriculum, modes of learning and course structures. The advent of the Fourth Industrial Revolution (4IR), characterised by the proliferation and fusion of advancing technologies across the physical, digital and biological domains, will require individuals to learn new skills continuously (Schwab, 2016). Lifelong learning will acquire renewed importance, and substantial national programmes will be needed to retrain and upskill people whose jobs will be affected by disruptive technologies (Leopold et al., 2018). The call for online and blended learning has been long made to improve access, retention and progress in HE (Osborne et al., 2011). In this regard, the COVID-19 pandemic brought an unprecedented and rapid digital transition in the HE sector while we are still navigating the implications of this transition.

The fifth theme elaborated on the diversity within the higher education sector, capturing the diversity of students, academic disciplines, institutions, and diverse time frames of various stakeholders involved. Such multi-faceted diversity might manifest in several forms, including creating accessible learning resources, design of assessments, modes of learning, course/programme structures, and learning spaces (cf. Morgan and Houghton, 2011).

The sixth theme concerned the frameworks to value and evaluate higher education provision and the implications that those frameworks might have on the value of learning spaces. University spaces also play a crucial role in achieving institutional civic missions of supporting local communities (The UPP Foundation Civic University Commission, 2019). The higher education sector is actively facing up to the challenge of reducing carbon emissions. Implication for university buildings includes maximising spaces' use, improving the energy performance of new and existing buildings, reducing embodied carbon, enhancing biodiversity and minimising emissions from activities such as travel and catering (cf. Universities UK, 2021).

The six themes discussed above highlight that curriculum and learning approaches within higher education are continuously evolving and diverse. University buildings must act in tandem and need to be constantly adapted. In order to address the fluidity of learning spaces in their design, management and use, we need conceptual tools to help us do so (Latour and Yaneva, 2008).

Learning spaces as socio-material practices: A theoretical orientation

My research on adaptations of a library building over 50 years demonstrates the fluidity of the building in response to emerging technologies, pedagogical innovations, and the creation of new library services. These observations demand a shift from thinking about learning spaces as fixed entities. Moreover, adaptability is not an inherent quality of the building. Building adaptations are achieved through interactions with heterogeneous entities in socio-material practices (Patel and Tutt, 2018). The conception of learning spaces as enacted in socio-material practices has the following three implications. Firstly, incorporating adaptability features in the physical elements of learning spaces will not be sufficient to achieve adaptable spaces. The practices of adaptations involving the agency of different users to make changes need to be designed and supported. Secondly, learning spaces need to be considered, not just as physical entities but in the expanded yet integrated realms of physical scales, digital tools and organisational practices (Acton, 2017). Thirdly, design interventions need to integrate the physical spaces, technologies and pedagogies while reflecting on the political processes of leveraging a particular version of reality over another (Mol, 2002).

About the LE-DR Lab

One of the areas for future development from the HEDQF horizon scanning project was to gather student perspectives on the themes. The Learning-Environments Design Research Laboratory (LE-DR Lab; <https://futurelearningenvironments.org/>) at the Welsh School of Architecture Cardiff University offers a glimpse of issues that matter to the students and their visions to address those issues. The students in the lab collectively contribute the knowledge in the field of university spaces by drawing from their own experiences as students and through design research. Outputs from the student work aim to integrate spatial, digital and organisational strategies. This chapter provides insights into the design research questions, methods and emerging outcomes by the LE-DR Lab students.

The LE-DR Lab runs during the academic year of 2021-22 as part of the MA Architectural Design programme, which emphasises developing design research skills. The lab is a place for experimentation and discovery. The lab infrastructure includes the physical studio, digital tools, conversations with tutors, peers and stakeholders and the site of investigation, which is the Cardiff University campus. The lab provides three areas of exploration:

- Developing an intellectual basis

The seminal texts, published literature and architectural precedents are reviewed, addressing universities' role, architectural agency to promote knowledge creation and exchange, and design research approaches. The review is followed by identifying implications and translations for architectural considerations. Moreover, the emerging architectural interventions are, in turn, situated within this body of knowledge.

- Developing an integrated spatial, digital and organisational response

Within the context of an overarching brief, each student selected a theme and an associated site in the Cardiff University campus for suggesting an intervention. The students could determine the scale of the design response (interior, building, inter-building, neighbourhood, city). Each student will also develop a unique methodology based on design research methods (some examples include Simonsen et al., 2010; Stickdorn, 2018; de Jong and van der Voordt, 2021; Sevaldson, 2011; Elsbach and Stigliani, 2018). The emerging design research methodology and architectural interventions integrate physical, digital and organisational realms to achieve a multi-faceted strategic approach.

- Developing personal design-research practice

The design research process consists of iterations between questioning, proposing and reflecting (Image 2). The ongoing testing of emerging solutions allows students to develop their own design-research practice based on their values, priorities and strengths. The critical lesson to learn is choosing the suitable method or tool for the design research questions and continuously reflecting on their practice.

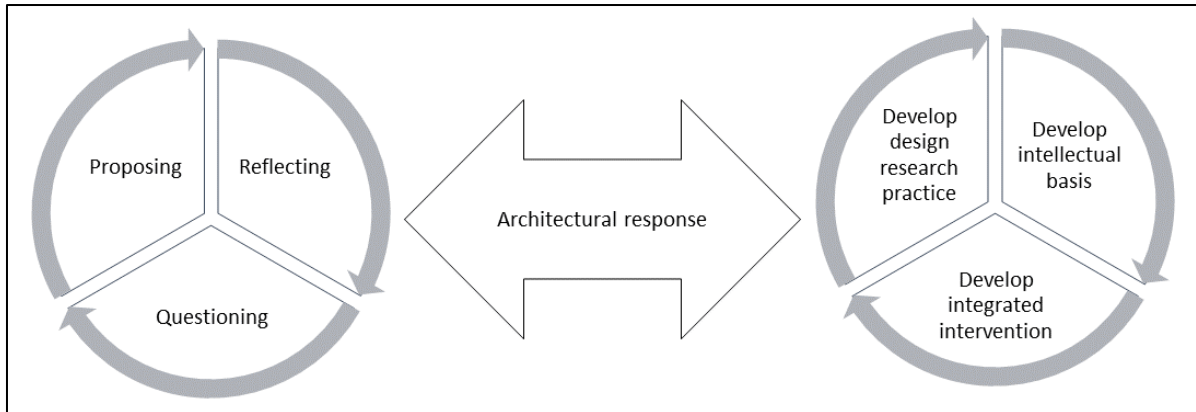


Image 2 LE-DR Lab rituals

Some explorations from the LE-DR Lab

Four ongoing student projects from the LE-DR Lab are discussed below, representing their emerging outputs. The projects are not complete, and the methods discussed below are evolving. These projects explore the interactions between users, technologies and physical spaces using various methods. The projects translate the concept of learning spaces as socio-material practices in architectural outcomes and design processes.

Fused learning spaces

Project by: Chengxin Ruan

This project envisions learning spaces where physical and virtual realms are fused and social interactions between individuals and information are mediated through emerging technologies. A range of emerging technologies such as kinetic walls, wearable devices, new types of screens, and augmented and virtual reality applications was studied. A card deck summarising information about these technologies was created as a design tool to support their integration with architectural elements. The screenplay script (Image 3) was used to imagine the experience and interactions between users, emerging technology and the refurbished library building on the Cardiff University campus. This script method could be further developed along the lines of transcripts suggested by Tschumi (1994) to articulate the world of objects (learning spaces and technology), the world of movements (learners) and the world of events (learning activities).

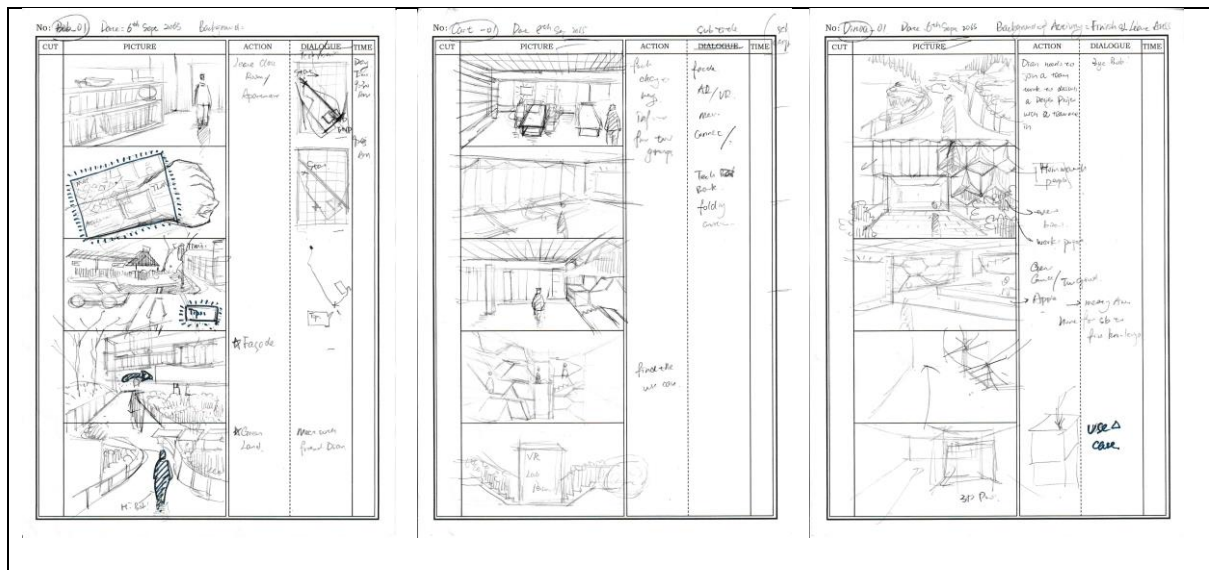


Image 3 Use of screenplay script to explore experiences and interactions between technological tools, physical building and learning activities. Source: Chengxin Ruan

Outdoor learning spaces

Project by: Haoyi Jiang

In this project, Flourish Theory (Clements-Croome et al., 2019) is adapted to re-imagine the outdoor spaces within the Cardiff University campus. A monopoly board game is designed to align user activities with the elements of Flourish Theory. The board game intends to not only enrich the architectural interventions but to involve users (mainly students) in the design process of outdoor learning spaces.

Learning terminals

Project by: Le Ma

This project contributes to creating a learning culture at an urban level by connecting universities with local communities. A network of learning terminals is proposed at strategic transport hubs where learners from the university and beyond could engage in learning activities. The learning activities align with the areas for skills development identified in the Cardiff Capital Region (Cardiff Capital Region Skills Partnership, 2019). Personas are used to inform the brief and design of the project (Image 4). While the personas in this project are based on qualitative data, they could be developed and verified by combining qualitative and quantitative data (Stickdorn et al., 2018). The most important lesson is to create evidence-based personas and review them continuously. Personas as a tool offer to unpack the user interactions with digital and physical elements.

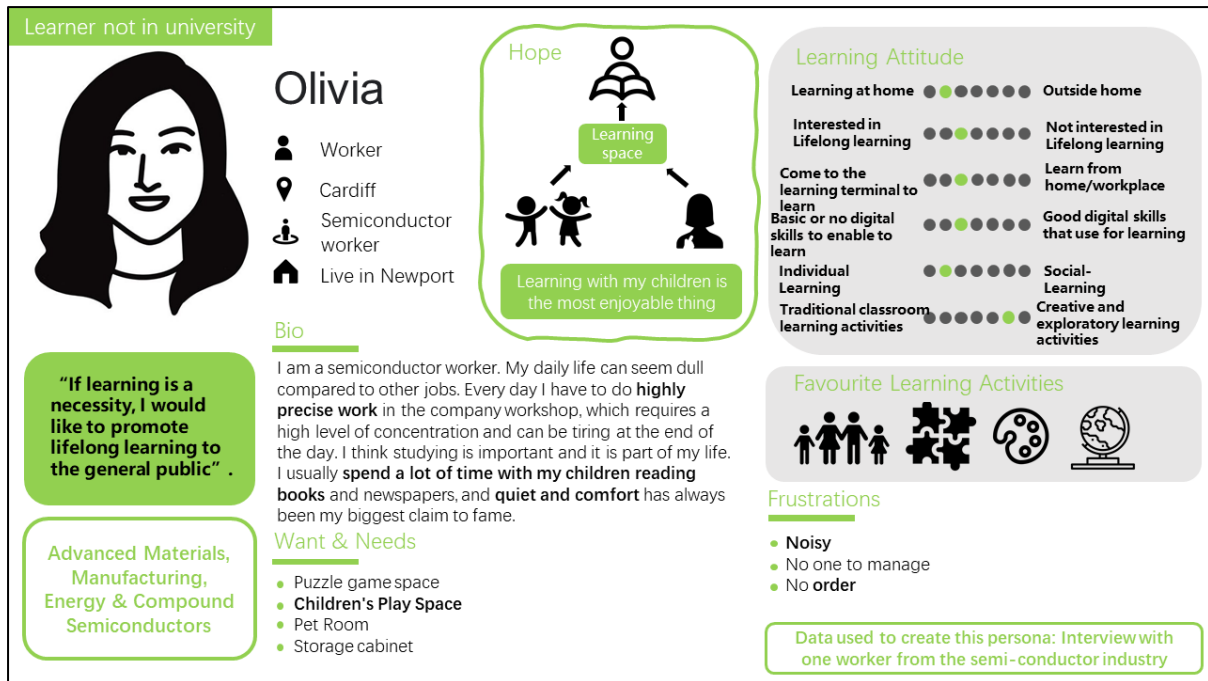


Image 4 Developing personas to inform project brief and user experience. Source: Le Ma

Conclusions

The context of higher education is rapidly changing due to the digital transition enforced by the COVID-19 pandemic, the emergence of new models of education and the advent of the Fourth Industrial Revolution. In tune with these changes, the conceptualisation of learning spaces needs to embrace the social and material interactions in which learning happens. The LE-DR Lab applies this conception in the design practice through various tools such as scripts, board games and personas. Moreover, the LE-DR Lab engages with design students to foreground visions of the future campus from students' perspectives, bringing learners to the heart of learning space design.

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