THE UNIVERSITY *of* EDINBURGH

Space, Sociomateriality, Sound.
The Learning Spaces of Higher Education

James Lamb

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Declaration

I declare that this thesis has been composed solely by myself* and is my own.
It has not been submitted, in whole or in part, in any previous application for
a degree or professional qualification.

*This thesis was composed using a Macbook Air. I mostly used a Zoom H1 to generate field recordings, and a Panasonic LUMIX DMC-TZ70 to take photographs. On other occasions I documented sights and sounds using an iPhone SE. I stored and worked with these and other data using Adobe Photoshop, Apple iMovie, Apple Photos, Apple Pages and Freeverse SoundStudio3. I have used Mixcloud, Thinglink and Vimeo to host the playlists, sound maps and videos that are presented across the following pages.

I compiled this thesis at home, in the university library and across a range of cafés. These learning spaces were nearly always shaped by music. According to the *Most Played* list in iTunes, I composed this thesis to a soundtrack of Erik Satie and Ennio Morricone, Saint Etienne and Sufjan Stevens, The Beat Escape and The Beach Boys.

Acknowledgements

As will become apparent in the chapters that follow, this thesis owes a considerable debt to the enthusiastic participation of students from the American History and Architectural Design courses at Ancient City University. These students allowed me to observe, document and ask questions about the different settings across and beyond campus where they spent time writing and reading, drawing and thinking. They sent me postcards of their learning spaces, allowed me to shadow them as they worked on assignments, and shared their music playlists and Internet history with me. For their part, academic staff invited me into their classrooms, meetings and assessment days, helping me to understand their approaches and attitudes around teaching, technology and learning space. The stories that unfold across this thesis are a great deal richer and more colourful thanks to the patience and cooperation of these staff and students and I want to express my thanks for their participation in my research.

I also want to acknowledge the tremendous advice and encouragement of my supervisors, Professor Siân Bayne and Dr Jen Ross, without whom I would never have found my way to the design studio or history classroom in the first place. Also within the *Centre for Research in Digital Education* at the University of Edinburgh, Dr Michael Gallagher was a constant sounding board for my ideas, often as we cut a path through the campus at the end of the day.

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Abstract

This thesis is concerned with the relationship between digital technology and the learning spaces of higher education. Across an academic year I observed and documented the learning spaces and practices that were emergent within undergraduate courses in American History and Architectural Design at a UK university. Drawing on field recordings, photographs and conversations with students and staff, and supported by theoretical work in sociomateriality, digital technologies were shown to be deeply implicated in the negotiation of learning spaces across and beyond the campus.

I make three central arguments within this thesis. First, the presence and positioning of digital technologies within the classroom enacts particular epistemologies and power dynamics, although this manifests differently across courses of study. Second, the flow of data, combined with the proliferation of networked technologies, reconfigure the boundaries of the campus, as a single setting comes to accommodate a range of spatial identities. Third, digital technologies are complicit in the neoliberalisation and commodification of learning spaces, and the educational practices that are performed in those settings. In order to make these arguments I have looked to the critical and methodological value of sound, often in conjunction with images and other data. Sonic methods and materials have been largely overlooked within education research and yet, as I demonstrate, the digital reproduction of sound helps academic staff to enact authority over a classroom, and supports students as they seek to establish and configure personalised learning spaces. In giving due attention to the role of the audible within my research, this thesis is presented in richly multimodal form where argumentation is advanced through a juxtaposition of written commentary, photography and field recordings.

This thesis make an original contribution to scholarship in digital education, sound studies and social science methodology. Further value is to be found in the potential to inform the thinking and practice of designers, teachers, educational technologists and institutional managers as they conceptualise and construct spaces for learning.

Lay summary

This thesis is concerned with the relationship between digital technology and the learning spaces of higher education. Across an academic year I observed and documented the learning spaces and practices associated with undergraduate courses in American History and Architectural Design at a UK university. Drawing on audio recordings, photographs and conversations with students and staff, and supported by theoretical work in sociomateriality, digital technologies were shown to be deeply implicated in the negotiation of learning spaces across and beyond the campus.

I make three central arguments within this thesis. First, the presence of digital technologies within the classroom helped to shape the hierarchical relationships that existed between students and staff, even if they varied across different academic subjects. At the same time, technologies helped to re-enforce how the nature of knowledge was itself understood. Second, the flow of data and proliferation of digital devices meant that the classroom and other settings supported a range of purposes. Third, digital technologies brought a more commercial dimension to educational spaces and practices.

To make these arguments I generated and worked with audio recordings and photographs in ways that have been overlooked in existing education research. This has included using sounds and images to help deliver the central arguments of this thesis.

The value of the research presented here is to be found in how it can inform the thinking and practice of designers, teachers, educational technologists and institutional managers as they conceptualise and construct spaces for learning.

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Chapter 1. Introduction

Entry

This thesis asks how higher education learning spaces are being affected by the pedagogic and societal shift to the digital. It is concerned with the classrooms, corridors and cafés where learning happens, and how these places and their practices are contingent on computers, code and other digital technologies. It is also about the marketisation of higher education, the subtle yet profound influence of the algorithm, the role of audio technologies in establishing educational environments, and how these different interests coalesce in the negotiation of learning spaces across and beyond the campus.

For the duration of an academic year I documented the learning spaces associated with undergraduate courses in American History and Architectural Design at 'Ancient City University', a prestigious UK higher education institution. Across two semesters I generated audio recordings, photographs and written notes as I observed, spoke and spent time with students and academic staff. I attended lectures, tutorials, workshops, exhibitions and presentations. I sat with students as they drafted essays and drank tea. I watched and listened as they cast models in concrete and chatted between classes. I was invited into their homes and accompanied them as they travelled between and beyond the different corners of the University. For their part, academic staff welcomed me to team meetings and marking days. They let me join them for 'office hours' and we sat down over coffee where they shared their thoughts around pedagogy, technology and the environments where teaching and learning happen.

Combining ethnography with the creative emphasis of speculative methods, my research stretched beyond the university estate to the top floor student flat, the subterranean jazz bar and the transitory learning space of the train journey. Through the elicitation of 'digital postcards', students allowed me to see and hear the range of personal, domestic and impromptu settings where they paused to write, read and draw. We also worked together on the creation of playlists which opened my eyes and ears to the way that music helped

to nurture environments that were favourable to learning. These and more traditional ethnographic approaches were followed by thematic analysis, with a particular emphasis upon what sonic materials and practices could tell me about the relationship between technology, pedagogy and space. All of this methodological work was supported by a sociomaterial framework, with its interest in the wide range of human and non-human interests that are interwoven in the performance of practices and places. Sociomateriality, as will become apparent across this thesis, was well-suited to investigating the complex and contingent nature of those settings where educational activity happened.

Environment

The story that unfolds across this thesis comes at a time of considerable change in the way that university learning spaces are conceptualised and constructed. Across and beyond the UK vast sums of money have been spent renovating and rethinking higher education campuses (Goodyear et al. 2018; Mulchahy et al. 2015; Boddington & Boys 2011), often in response to a pedagogic shift towards student-centred and collaborative learning. New flexible classrooms are seen to support a range of teaching approaches (Ravelli 2018; Boys 2011) while libraries have introduced designated spaces that stimulate, rather than silence, discussion (Johnson & Khoo 2018; Dugdale 2009). Elsewhere, parts of the university estate that previously served a functional purpose - corridors and reception areas - have been reconfigured to support moments of impromptu learning and conversation (Coulson et al. 2015). As I will discuss in Chapter 5, physical teaching spaces retain considerable pedagogic, symbolic and strategic value, however learning has become increasingly dispersed beyond the classroom and campus. The contemporary student is seen to enjoy new levels of choice and mobility (Carvalho et al. 2016; Randall 2015), exercising a considerable degree of freedom over where and when to sit down and draft an essay or an architectural plan. These changes, as I will discuss in Chapter 2, are also a response to the increasingly market-oriented and neoliberal higher education landscape. The money and time that has been spent renovating and reimagining the university's learning environments are at once an investment in teaching and learning, but also its status, student satisfaction levels, attractiveness to prospective applicants and ability to generate income.

Digital technologies, I am going to argue across this thesis, are woven through this conceptual and physical renegotiation of university learning space. Through the projection of the lecturer's voice (Chapter 4), the procurement of classroom technology (Chapter 5) and the streamed listening practices of students (Chapter 6), digital technologies help to shape educational spaces and the activities that take place in these settings. What will become clear, though, is that technology operates in combination with other agents, rather than deterministically dictating change, or being deployed to realise a pre-determined educational environment or strategy. From a sociomaterial perspective, technology can only exist in conjunction with other human and non-human resources. The computer-aided design package is understood through its relations with the materialities of the architect's desk, the learning outcomes set out in the assignment brief, the disposition of the student in the moment, and a multitude of other interests. It is a similar story in the lecture theatre where the laptop computer is relational to the university's investment in wifi, the location of plug sockets, the subject matter being covered in class and its ability to compete with social media for the student's attention. As we will come to see, sociomateriality also challenges the delineation between 'online' and 'physical space', instead emphasising the hybridity and flexibility of educational environments.

Building knowledge

The central argument of this thesis is that digital technologies are deeply implicated in the negotiation of higher education learning spaces. Conceptualising learning space as 'negotiated' offers a nuanced way of understanding the complex, contingent and fluid nature of those settings where educational activity takes place. Research around university learning space has often deferred to some fairly simplistic binaries (critiqued in detail by Boys 2011), proposing for instance a distinction between formal and informal teaching areas, and assigning students and courses the status of either being on-campus or online. What quickly became clear in my research, as I will set out from Chapter 4 onwards, is that learning spaces do not lend themselves to precise delineation or straightforward categorisation. I will also challenge the idea that the physical make-up of a classroom deterministically governs student behaviour, or conversely that educational or learning space designers can manufacture a pedagogic outcome by arranging the features of a

classroom in a particular way. By drawing on conceptual work in sociomateriality I will highlight the complex and contingent nature of those settings where educational activities take place. A learning space is defined neither by the actions of students and teachers, nor its tangible qualities, but instead emerges through the entanglement of these and other human, physical, commercial, technological, pedagogic, political and historical interests.

What will also be clear from the early stages of this thesis is that a single setting supports a range of spatial identities. The lecture theatre and design studio are designated learning spaces, but they can also simultaneously be social and domestic environments. A classroom, I will argue, can be at once hierarchical and democratic, communal and personal, and physical and virtual, enacted in each case through the presence and positioning of digital technology. As I explain below, different spatial identities provide the basis for the major discussion chapters of this thesis. From the positioning of amplification speakers in the classroom (Chapter 4), through the institutional procurement of software (Chapter 5), to the streamed playlists that inspire students as they craft essays and architectural plans (Chapter 6), learning spaces emerge through acts of negotiation that are subject to digital technology, woven together with politics, pedagogy, personal history and other interests besides. It is in these three chapters that I will present the central arguments of my thesis.

1. The presence and positioning of digital technology within a learning space nurtures particular epistemologies and power dynamics.
2. The conceptual boundaries of the classroom and campus are reconfigured by digital technologies and the flow of data: learning spaces are fluid, hybrid and emerge through the negotiation of a multitude of human and material resources.
3. Digital technologies contribute towards the neoliberalisation and commodification of learning spaces and the practices that are performed in those settings.

Through these arguments, this thesis makes an original contribution to knowledge in the following ways. First, when the critical value of sound has been under-considered both in education research and in the literature around learning spaces, my work demonstrates how an attention to sonic material and practices can be used to expose the enactment of

power and epistemology in different disciplinary and physical settings. Second, when there has recently been a move towards recognising that educational settings are characterised by fluidity and hybridity (rather than being a container or canvas for educational activity), I have provided rich empirical data that clearly expose the complexity of learning space. With this data to draw on, I have been able to show that digital technologies contribute towards an alternative kind of flexibility around learning space as the proliferation of digital devices and the unchecked passage of data means that a single setting supports a range of spatial identities. Third, while neoliberal critiques of higher education have recently become commonplace, interest has rarely extended to those settings where learning takes place: through my discussion of the commodification of learning space I have started to address the lack of research in this area. These contributions are of value to researchers and to the field of digital education, and can also inform thinking and practice around university learning spaces by designers, teachers, educational technologists and managers.

The work presented here also makes an original methodological contribution, particularly through my attention to sound. As I will cover in my discussion of the literature (Chapter 2), sonic methods have tended to operate on the margins of qualitative research (Pink 2009; Dicks et al. 2011), sidelined by the ocular-centric nature of social inquiry (Daza & Gershon 2015: 640). The language-based traditions of scholarship, combined with print-oriented publishing models, have contributed towards to what Steven Feld bemoans as the sub-standard presentation of sonic data, thereby undermining the validity of the audible (Feld & Brenneis 2004). In the case of education research, sound has existed in the background, when it has been heard at all. My own approach in undertaking and presenting this research has been to place sonic material and methods centre stage. Through an attention to the audible, in conjunction with other data, I have tuned a critical ear to the power dynamics and commodification of learning space, and how digital technologies are implicated in these practices. The significance of the audible to my research can be found, among other places, within interactive sound maps of the design studio and lecture theatre (presented in Chapter 4). The central arguments of my research are also advanced through a series of short videos that combine field recordings with photographs and textual data. Sound, in the form of music, is also to the fore within the collaborative

playlists that are heard and explained in Chapter 6. Although Jacob Nerenberg from University of Toronto's *Department of Anthropology* has spoken about the potential for using playlists within ethnography (Hertzman 2017), to date the music compilation has tended to exist as an interesting accompaniment piece to social research (where it has featured at all), rather than a critical device in its own right. The approaches described here therefore propose new methods for the investigation of learning space, while at the same addressing Feld's call to give better attention to the quality and presentation of sonic material in the dissemination of research findings.

A different methodological contribution of this thesis can be found in the way that I combined some of my earlier approaches to the generation of learning spaces data (Gallagher, Lamb & Bayne 2016; Bayne, Gallagher & Lamb 2013), with Gourlay & Oliver's use of longitudinal multimodal journaling (2016). As I will explain in Chapter 3, the use of what I have called 'digital sociomaterial journaling' offers a way of gaining insights into personal and impromptu learning spaces that are otherwise difficult to access for practical and ethical reasons. In my discussion of the literature (Chapter 2) I will argue that the critical and strategic interest in the dispersal of learning beyond the campus has not been matched by attempts to understand the nature of those settings: my own method, I will suggest, highlights both the value and feasibility of attempting to do so.

Places and people

Ancient City University is a large, research-intensive higher education institution with an academic reputation established across several centuries of scholarship. In common with many UK universities it has undergone considerable expansion across the last two decades, a period characterised by the massification of higher education and the introduction of tuition fees. The University has a combined undergraduate and postgraduate population of around 35,000 full-time students, participating in a wide range of programmes in medicine, the humanities, sciences, social sciences, and creative arts. Two of its undergraduate courses, *American History* and *Architectural Design*, provided the setting for my research (for reasons discussed in Chapter 3). Ancient City University, alongside other members of the *Russell Group* of prestigious institutions, attracts a considerable amount of funding through the research activity of its academic

staff. At the same time, income generated through fees, particularly those drawn from international markets, is vital to the University's financial sustainability. The task of recruiting students is made easier by Ancient City University's performance within international league tables where it is consistently ranked among the best institutions. The University's prestige and reputation contributes to its popularity as a destination for students, reflected in a high ratio of applications to available places. This level of competition helps to explain why, in order to secure entry to the University, students are expected to demonstrate a high level of academic talent, normally articulated through exacting entry qualifications. This was certainly the case for students enrolled on the American History and Architectural Design courses, who had secured a place on programmes that received many more applications than there were available places. With any financial and academic requirements satisfied, these and other students could look forward to spending a considerable part of the following years in a series of University buildings spread across the city centre.

As will be explored in detail in Chapter 4, the American History course was taught across two large lecture theatres and a series of small tutorial rooms. In contrast, the Architectural Design course made use of a studio, technical workshop, presentations rooms, lecture theatre and other settings. Students from both courses had access to academic libraries and computer labs, while a considerable amount of work took place in personal learning spaces beyond the campus, as we will come to see. The following video, compiled from audio recordings and photographs generated during my fieldwork, goes some way to reflecting the character of Ancient City University, with its combination of historic and modern learning spaces, spread across a series of sites. In common with all of the digital content across the next six chapters, the video can be accessed by scanning the QR code or by clicking on the image (in the pdf version). The videos are also hosted in sequence in a Vimeo channel at: https://vimeo.com/channels/1467994

The American History course accommodated a cohort of 300 students, a limit set by the maximum capacity of the two lecture theatres where most teaching took place. The class

was made up of History undergraduates alongside fellow second-year students following programmes in education, economics, politics and other humanities and social science subjects. The course was taught through a traditional mixture of lectures and tutorials, with assessment taking the form of essays, examinations and, to a much lesser extent, a mark allocated for tutorial participation. In contrast, the Architectural Design course was a compulsory component in the University's architecture degree and was entirely made up of second-year undergraduates from that programme. This class comprised 140 students who attended a small number of lectures, but spent considerably more time undertaking group and individual work within a series of partitioned bays in the design studio. The Architectural Design programme was characterised by high levels of contact time with a designated tutor, alongside an emphasis on collaboration with peers. Assessment came in the form of a design project and accompanying portfolio, where students proposed an architecture school (semester 1) and then a library (semester 2). The teaching spaces of each course are discussed in detail at the beginning of Chapter 4.

Course	**Students**	**Academic Staff**
American History	John Brown Heidi Green Debbie Harris Ella Ness Neville Smith	Neil Jardine Andrew Marks Charles Hart Evelyn Hopkins Timothy Stone
Architectural Design	Yvonne Fisher Sandy McFall Matthew Redfearn Edward Simpson Robbie Stanton	Richard Gates Isobel Law Graham Locke Victor Marsh Olivia Yates

The key participants within my research

As well as attending classes alongside the full cohort of learners, I more closely investigated the learning spaces and practices of students from a single tutorial group associated with each course (explained in Chapter 3). This included observation, informal conversation and then, at the end of the academic year, semi-structured interviews with

five students and five tutors from each subject. In presenting my research I have described, reproduced and discussed the actions and insights provided by the individuals I worked with most closely, as presented in the table above. Other students and members of staff who contributed less prominently will be introduced as the story of my research unfolds.

Ancient City University and anonymity

As this thesis occasionally broaches sensitive subject matter, for instance when I talk about the commercialisation of higher education in Chapter 5, I have used 'Ancient City University' to obscure the identity of the institution where my research took place. I have also changed the names of individuals and the courses with which they were associated, although 'American History' and 'Architectural Design' offer a correct description of their subject matter. In taking this approach I gave careful consideration to Walford's discussion of the practical and ethical implications of anonymity in educational ethnography (2008). While recognising the widespread practice of anonymising educational organisations and assigning pseudonyms to research participants, Walford questions the efficacy of these approaches when information available online makes it possible to rapidly identify similarities between the described characteristics of a research site and its real-life setting. My own feeling is that when scholarship is increasingly published online I had a duty to attempt to conceal the identity of research participants and their institution from a casual Internet search. In the case of images produced within this thesis, where appropriate I have used photo editing software to remove or obscure the institutional branding found across doors, walls, paper cups, flat screens televisions, start-up menus and other surfaces. I have also pixellated or blurred the faces of any individuals who did not give consent to appear in my research, mostly in the case of data generated by students within the digital journaling exercise explained in Chapter 3. Therefore where an individual can be identified through audio or image within this thesis, it can be assumed they gave permission for this to be case.

Looking beyond this predominately practical concern, Walford also draws on Nespor's discussion of anonymity and place (2000) to raise a more fundamental question around the concealing of identity within ethnographic research. Anonymising the research site, for

instance by altering or removing identifiable information about its structures, students and appearance, represents an ontological 'decoupling of events from geographically and historically specific locations' that, according to Walford, lends the results a 'spurious generalisability' (2008: 235). The use of anonymity, whether through the use of pseudonyms or by omitting practical and personal detail, is presented here as creating a kind of representational gap between the research site and its subsequent reporting. There is also an implied expositional dilution where the presented arguments become less convincing on account of having been removed from the perceived reality of the context from where they were emerged. My own position, however, is that any persuasive distance between the field site and the presentation of findings is addressed by the prominence that I have given to audio recordings and photographs across this thesis. As I hope the earlier video demonstrates, the sights and sounds of a university's classrooms, computer labs and corridors offer a considerably richer and more revealing representation of a university than is achieved through an institutional title or the badging of its degree programmes and courses. A wider consideration of ethics around my research can be found in Chapter 3.

Multimodal exposition

The interweaving of aural, visual and textual content across this thesis has been a conscious attempt to exploit the potentialities of the digital form in the exposition of ideas. The pedagogic and societal shift to the digital has presented new opportunities to present scholarship in richly multimodal form as we enjoy greater freedom to select and configure resources in ways that are most suited to the knowledge we wish to convey, as well as the anticipated audience for our work (Kress 2005). In this context, multimodality refers to the way that knowledge is communicated and interpreted through the simultaneous juxtaposition of different types of semiotic material (Kress & Van Leeuwen 2001), for instance via images and words, but also through gesture, gaze, posture and all the resources that have the potential to carry meaning (Jewitt 2009). The shift from paper to screen has reduced the dependence on the printed word as students, tutors and researchers have become newly able to convey meaning using animation, image, audio and other content, to the point that it has become increasingly difficult to find online content that is *not* multimodal (Jewit et al. 2016). In the case of this thesis I have found the

multimodal orchestration of sound, image and language well suited to conveying the colour and complexity of the classroom and other learning spaces.

When ethnography has tended to attach considerable importance to rich description, I have previously adapted what Norris refers to as 'modal density' (2015) to argue that the digital form can nurture a multimodal richness that extends beyond the representational powers of the printed word (Lamb 2018). Meanwhile in separate research around multimodal ethnography in urban settings (Lamb, Gallagher & Knox 2018) I have made the case that digital technologies are particularly suited to documenting the wide range of semiotic material that we use to make sense of our physical surroundings, even if this carries its own challenges (discussed in Chapter 3). On a more practical note, when the critical value of sound within educational inquiry is gradually beginning to be recognised, it was important that my own use of field recordings should be up-front alongside other more traditional ethnographic data, rather than relegated to footnotes or lost within a long list of appendices. With a view to longevity, an arrangement is in place with the appropriate colleagues in my institution to archive the digital content in this thesis. The intention here will be to save audio and video material in simple formats such as WAV. and MP4. in order that they do not become obsolete as media playing devices continue to evolve.

Terminology

Before going any further I want to explain some of the key terminology that I have used across this thesis. To begin, I take the position that a **learning space** is any setting where educational activity takes place. My approach here differs from much of the critical discussion around learning space where there is a conflation with the designated teaching environments of the university campus. The mention of 'learning space' might immediately conjure up images of lecture theatres, laboratories and libraries, however we also need to picture the ostensibly domestic, social and transitory spaces where students and teachers engage in educational activity. As will become evident across this thesis, through free wifi and a finger swipe, a wide range of non-campus settings can be renegotiated as productive learning spaces. Between Chapters 4 and 6 we will visit a range of settings beyond the campus that were seen to be as conducive to reading,

writing, designing and thinking as those spaces that had a designated educational purpose. The café, cellar bar and communal flat were all shown to be places where students made progress on coursework assignments. In the case of one student, a stroll across the city centre offered a route to overcoming obstacles holding up progress on his design project. Other transitory settings included the train carriage and the cabins of the cruise ship and passenger jet, each of which temporarily became a place of learning and transit. An alternative articulation of learning space can be found in the literature around digital educational environments: discussion boards, virtual worlds and learning management systems, for instance. Rather than seeing these screen-mediated settings as discrete learning space, I instead take the position that they need to be understood as entangled with the physical settings in which they are accessed, in conjunction with a wider range of human and material resources.

This openness to the range of settings that can support drawing, writing and other scholarly pursuits, raises the question of what we *cannot* understand to be a learning space. I take the position that in the case of the library, lecture theatre, laboratory and other environment that has been specifically designed to support educational, these can permanently be seen as learning spaces (although they can also support other activity, as will become apparent from Chapter 4). In the case of the kitchen, corridor and construction site that ostensibly exist with a purpose beyond pedagogy, these settings are learning spaces for the duration of time that they are occupied by a student as he or she undertakes work relating to her degree programme. The knowledge that is acquired by the trainee chef or apprentice joiner in these setting are distinct from the *academic* learning that this thesis is concerned with. The conceptualisation of space offered here is a major theme of my discussion of the literature in Chapter 3. To avoid repetition, I have used 'learning space' interchangeably with 'educational setting'.

Digital technology is also a term that merits some clarification. In everyday usage technology is often used as a way of referring to sophisticated devices and the purposes they serve. Traced back to its etymological roots, however, technology accounts for crafts, skills and methods, a position which I have found to be a useful way of encompassing the body of objects and practices associated with the generation, analysis, storage,

manipulation and reproduction of data. This includes objects (e.g. the computer), software (e.g. the word processing package) and environments (e.g. social media spaces), although as will become apparent, these need to be understood as inter-connected. Digital technology also refers to unseen data processes including wifi connectivity and computer code, algorithms and analytics, and the flow of data between the devices and environments that have become a feature of learning spaces and everyday life. These digital technologies always co-exist with more conventional educational technologies such as the chalkboard, book and architect's desk (and other human and non-human resources), but are made distinct through their relationship with data. Again, to avoid repetition across the chapters that follow, I have also used the term 'digital resources' to account for the same technological materials.

Structure

Beyond the introductory chapter presented here, this thesis opens by looking to the critical discussion around learning spaces, sociomateriality in education, and sound in social research. For the most part this represents a fairly conventional review of the literature, however at different times I have drawn on examples from my fieldwork to support the explication of some contested concepts. It has also been my intention that this approach would support the cohesion of this thesis by making explicit connections between the literature and my own ideas and experiences. From there I move on to discuss the methodological approach that supported my work (Chapter 3). As sound has been under-considered within educational inquiry, and there has been a scarcity of empirical research investigating learning spaces outside the classroom, it has been important to spend time describing and offering a rationale for the methods I have introduced above.

With the critical and methodological scene set, in Chapters 4, 5 and 6 I present the central arguments of this thesis. Each of these Chapters offers its own conceptualisation of learning space. Chapter 4 - 'Thinking Space' - is concerned with the nature of knowledge, pedagogy and power dynamics across the learning spaces of the American History and Architectural Design courses. Central to my discussion here is that hierarchy and epistemology are enacted and exposed through sound in conjunction with digital

technologies. Within the same chapter I will argue that a single educational setting can accommodate a range of spatial identities, particularly achieved through the proliferation of networked devices and the flow of data.

Shifting attention from pedagogy and power to profit, Chapter 5 - 'Commercial Space' - considers the renovation of Ancient City University's campus against the increasingly neoliberal and commercially-oriented backdrop of higher education. Drawing on sociomateriality's ability to expose the interests and resources that are often overlooked in education research (Fenwick et al. 2011), and explored through a series of vignettes from the lecture theatre and design studio, I will argue that digital technologies are implicated in the commodification of educational spaces and their associated practices. Using as a case study the procurement and installation of a lecture recording system at Ancient City University, I will make the case that learning space is contingent on pedagogic, commercial, technological, strategic, cultural and other pressures and opportunities.

This interest in the commercialisation of campus space continues to be heard in Chapter 6 - 'Listening Space' - where I discuss how streamed music services contributed towards the negotiation of personalised spaces for learning. This will include drawing on insights that emerged around the creation of collaborative playlists, including the ways that students saw music as a way of nurturing an ambience that was in-tune with their need to draft an essay or architectural plan. Although students were clear that their listening practices were pedagogically-driven, I will argue that algorithms operating beneath the music streaming interface meant that that their aural environments, and therefore their learning spaces and practices, were also contingent on the interests of profit. What will also become clear in this chapter is the heterogeneity that exists around the nature and negotiation of learning spaces. This is a theme that echoes across my thesis, reflecting the messy reality of educational environments and our social world more generally (Law 2004). I will consider the implications of this complexity within my concluding chapter, alongside the wider significance of my findings for practice. Before doing any of these things, however, I want to talk about sociomateriality, space and sound.

Chapter 2. Sociomateriality, Space & Sound

In the previous chapter I introduced the context, character and central arguments of this thesis. With the scene set, I now want to critically consider the literature around sociomateriality, learning space and sound, including their relations with digital technology. Although I will approach each of these themes in turn, I will emphasise the compatibility and linkages that are present or suggested in the literature, for instance when I argue that sociomaterial approaches are particularly suited to investigating the complexity of learning space. Rather than strictly following the conventions of the literature review, at different times I have found it helpful to consider theories and studies in relation to the environments that I experienced during my own research.

Sociomateriality

In order to secure my preferred seat, and to avoid missing any activity that might inform my thinking, I was normally among the earliest arrivers to American History lectures. Entering the mostly empty classroom, my earliest impressions were of a space defined by its vast size, the prominence of its projection screens and the raked lines of seating that stretched from lectern to rear wall. As the auditorium filled and volume of conversation rose, my attention turned to the movement and interests of human bodies. My field notes separately documented the presence of students and the physical characteristics of my surroundings. In time, however, I came to understand the lecture environment as dependent upon the co-constituting relationship of these and other social and material resources.

Sociomateriality refers to a range of theoretical approaches which assume that actions, objects, knowledge and space exist through the entanglement of human and non-human resources and interests. Although it has become firmly established within educational inquiry, sociomateriality was originally conceived to support research investigating the relationship between technology and work practices within organisational life (see in particular Orlikowski 2007; Orlikowski & Scott 2008). The principal conceptual assumption was that organisational life needed to be understood as an entanglement between human

bodies, physical artefacts, technologies and other agents. As will become apparent from Chapter 4 onwards, in the setting of my own research, the educational life of the lecture theatre and design studio were shaped by complementarity and conflict between political, historical, cultural, commercial, pedagogic, technological and other interests.

The guiding principle of sociomateriality - that actions and entities cannot be solely attributed to human interest or agency - is to be found across a range of social science theories including, but not limited to, Complexity Theory, Cultural Historical Activity Theory, Spatial Theory and New Materialist theory, while also informing critical posthumanism and post-anthropocentric thought. Looking at education research in particular, sociomateriality is most commonly associated with Actor Network Theory, which emerged from work in Science and Technology Studies by Latour, Callon and Law during the 1980s. Actor Network Theory is set out in some detail within Latour's *Reassembling the Social* (2005) where he emphasises the connections and assemblages that make up our social world. Meanwhile, Latour & Woolgar's earlier study of the routines of the science laboratory (1979) is a much-cited example of the compatibility of sociomateriality with ethnographic research (which I discuss in Chapter 3).

With its belief that meaning is performed through the interaction of different elements, and its rejection of a strict delineation between human and non-human resources, Actor Network Theory has been a considerable influence on sociomateriality as it has come to be used and understood within educational inquiry. This can be found in a varied body of research from Aberton's work around learner identity in adult education (2012), through Mulcahy's discussion of performativity within teaching (2011) to Thompson's discussion of the politics of the delete button in online pedagogical practice (2012). Where social inquiry has traditionally approached meaning-making as depending on human interests and actions, sociomateriality is interested in the network of human and non-human discourses and phenomena that are implicated in these processes (Knox & Bayne 2013). Rather than seeing objects as dormant traces of culture, sociomateriality instead looks to the ways that they are entangled within the performance of action. As will become apparent across this thesis, the lectern, laptop and learning management system are co-dependent with human bodies in meaning-making practices (Thompson 2012). By

extending interest beyond the actions and interests of the student and teacher, sociomateriality, according to Fenwick et al., is able to valuably expose:

> the minute dynamics and connections that are continuously enacting the taken-for-granted in educational events: the clothing, timetables, passwords, pencils, windows, stories, plans, buzzers, bubble gum, desks, electricity and lights - not as separate objects, but as continually changing patterns of materiality. (2011: 8)

As I will explain in the next chapter, it was early in my fieldwork that my attention was drawn to the coffee cups and cutlery that seemed to be a constant feature of the design studio. Looking across my photographs I began to question whether these and other materials that I had initially assumed to be surplus to the central interest of my research, might in fact have something to say about the educational activities taking place at the architect's desk. As this thesis unfolds, the stories, plans, electricity and lights to which Fenwick at el. refer, alongside a multitude of other human and material resources, will be shown to be jointly implicated in the negotiation of learning space.

Assemblage, entanglement and the messy reality of our educational world

Central to much of the work around sociomateriality is the assemblage, a concept that can be traced to the 'agencement' of Deleuze & Guattari (1988). Where Deleuze and Guattari's philosophical interest concerned the way that no single body or context could exist in isolation, agencement has been translated and adapted into the sociomaterial assemblage, a device for describing and examining the entanglement of human and non-human resources that are complicit in the performance of spaces, objects and practices. In his discussion of sociomaterial power and space, Müller (2016) details five qualities of the assemblage that, from Deleuze & Guattari's perspective, support its function as an analytical tool. Assemblages, Müller outlines, are relational, productive, heterogenous, desired and bound to ongoing deterritorialisation and reterritorialisation (p 28-29). Applied specifically to the learning spaces context, assemblage provides a way of acknowledging the dynamics and linkages between objects and processes that create educational activities and artefacts (Fenwick et al. 2011). By recognising the relational nature of complementary and competing interests within the assemblage, we can attempt to better understand educational spaces, practices and policies. This is neatly captured by

Fenwick & Landri when they describe how the sociomaterial assemblage provides a way of recognising 'both the patterns as well as the unpredictability that make education activity possible' (2012:2). According to Law meanwhile, the assemblage allows us to confront the tendency within social inquiry to seek order and clarity in a world that is untidy and complex (2004). This will become particularly apparent in Chapter 4 when we enter the cluttered creativity of the design studio, and then spend time in the surroundings of the student flat where a range of contradictory practices would simultaneously unfold.

Law's work around mess in social research, covered in detail within my discussion of methods in the next chapter, encourages us to examine and interrogate the multitude of agents that characterise the messy reality of our educational world. This is a call that is heard by Mulcahy who uses the sociomaterial assemblage to interrogate teacher performativity and politics (2011) and the pedagogic practice of school classrooms (2012). For Aberton meanwhile, the assemblage provides a way of exploring identity and learning in community practices (2012) while Bhatt & De Roock used the entanglement of human, material and technological practices to support their digital literacies research (2013). Most relevant to this thesis, though, are recent studies where sociomaterial assemblage has been used to investigate the complexity and character of higher education learning spaces. Acton & Halbert use the device of the assemblage to explore how physical campus spaces foster reflexivity, collaboration and student-centred learning (2018). Shifting attention beyond the urban environs of the campus meanwhile, Robinson uses the assemblage to explore rural learning environments, where the range of agentive materialities extends to the animal kingdom and resources of agriculture (2018). Robinson combines the concept of affect with 'pedagogic assembly' to draw attention to the 'mutual learning and sharing [that] takes place both within, and informally beyond, the geographies of the classroom' (p 274). We will return to this idea in Chapter 4 in the context of the American History and Architectural Design courses.

As well as helping to expose the complexity of educational practice, the sociomaterial assemblage also challenges the binary discourse that has often characterised the relationship between learning and technology (discussed for instance by Hamilton &

Friesen (2013) and Bayne (2014)). By accepting that human and material agents are interwoven in the performance of educational activities and places, we are able to reject the technological determinist trope where digital resources are seen to dictate pedagogy and behaviour. At the same time, instrumentalist conceptualisations of digital technologies as tools that can be deployed to realise pre-determined learning outcomes are also disrupted by the co-constituting nature of teacher, machine and other material actors. In Chapter 5 I will discuss the complex assemblage of commercial, pedagogic and political interests that shaped the roll-out of a lecture recording system at Ancient City University. As the case study will demonstrate, sociomateriality alerts us to some of the unseen interests that shape the relationship between learning space and technology.

Sociomaterial critiques of higher education

The potential to expose the complex relations that shape practice and place has helped sociomateriality become established in research around a range of higher education themes. The value of sociomaterial approaches to educational inquiry has particularly been made by Fenwick, for instance as she investigated education reform (2011) and expectations around e-professionalism among students (2014). Together with Edwards, Fenwick demonstrated the role that sociomateriality could play in researching the political dimensions of education (Fenwick & Edwards 2011; Edwards & Fenwick 2015) and the nature of criticality and knowledge itself (Fenwick & Edwards 2014). The potential for sociomateriality to support a deeper understanding of the political subtexts to higher education is also demonstrated by Landri (2014) where he combines sociomateriality with a case study approach to surface different enactments of 'education policy space', including its assemblage of human and non-human resources. Shifting attention from policy to people, sociomateriality has been used to examine the attitudes and practices of students (Gourlay & Oliver 2013; Manidis & Goldsmith 2018) and staff professional development (Oliver et al. 2018; Watson & Michael 2015). Meanwhile Mulcahy used a 'sociomaterial story' approach to explore the different materialities that were implicated in the performance of teaching practice (2012).

Turning attention upon the higher education researcher, Postma proposes sociomateriality as a form of critique to support the understanding of educational practices and spaces

(2012). In Postma's view, sociomateriality frames critique as inherent within continuously enacted and evolving practices, rather than a discrete form of theorising, thereby allowing for the existence of different realities. For Thompson & Adams meanwhile, sociomateriality invites us to consider how the objects and devices of qualitative research are implicated in the construction of knowledge (2013). Drawing on the sociomaterial principle of an entanglement between human and material resources, Thompson & Adams argue that the recording devices and coding software involved in the generation and analysis of data need to be recognised as co-researchers, thereby 'introducing new tensions and contradictions' to knowledge construction' (p 342). This raises the intriguing question of whether, at a meta level, we might expect the publication of sociomaterially-informed research to include some kind of reflexive acknowledgement of the wider materialities that were implicated in its co-authorship (Scholes 2017). This is something I have attempted in my own thesis, discussed in Chapter 3 in relation to Law's work around mess in social research (2004). For the time being, however, I will simply make the point that studies exposing the sociomateriality of educational practice rarely consider how the research was itself a sociomaterial event (Fox & Alldred 2017), with its own ontological and epistemological subjectivities.

The sociomateriality of learning spaces

With its openness to the full range of resources that shape educational activity, sociomateriality provides a valuable, if under-used, approach to exposing the complexity of learning space. In recent years, however, there has been a gradual recognition of its ability to expose the contingent nature of those settings where learning takes place. Acton explains the value of sociomaterial research to learning spaces research in the following way:

> The benefit of taking a sociomaterial approach to spatial research is that it carefully illuminates the junctures, tensions and lived practice of spatial-social relationships. It allows attention to focus on embodied learning and teaching, the synergies between place and people, the relations between the imagined affordances implicit in infrastructure design and construction, and the experienced realities of the people who inhabit those spaces in practice. (2017: 2)

Therefore where learning spaces research has often adopted an ontological position where physical space is seen to engender particular behaviours (Oblinger 2005; Jamieson

2003), sociomateriality instead emphasises that human and material resources begin from 'a position of togetherness' (Acton 2017:3). It is not that the physical environment has no bearing on the actions of the student and teacher: rather, their influence is entangled within a wider assemblage of political, pedagogic, technological, cultural, historic and other interests. As Temple argues, academic buildings and classrooms 'are important in terms of human behaviour - but they are not all-important' (2018: 32).

The impossibility of neatly establishing or extricating human practices from their surrounding materialities separates sociomaterial perspectives on learning space from those that seek to establish a straight connection between physical setting and student performance. The student and teacher cannot govern, or be governed by, learning space when they are bound to its non-human materialities. This will become apparent in Chapter 6 when I question the idea that by listening to music, students were able to retreat into a world of sound that was entirely separate from some of the sensory and symbolic qualities that helped to define the train journey or a corner of the design studio. It is also illustrated in research by Mulcahy et al. (2015) where sociomateriality was used to explore the relationship between policy, pedagogy and physical learning spaces. Rather than establishing a causal link between learning space and pedagogic change, Mulcahy et al. argue that sociomateriality exposes how educational activity is contingent on multiple sets of relations and practices. Meanwhile the concept of the sociomaterial assemblage has supported research into ways that the physical space of the university fosters reflexivity and collaboration (Acton & Halbert 2018), and the distinct nature of learning that takes place in settings beyond the urban campus (Robinson 2018).

The studies described here approach educational environments from a range of perspectives, but are united in demonstrating how learning space is contingent on a broader range of influences than the actions of the student or the physical qualities of her surroundings. This is significant for my own research through the way that we are encouraged to see a learning space as being performed through shifting patterns of materiality, including but extending beyond the interests and actions of the teacher and student. As we will see in Chapter 4, the educational space of the lecture theatre depends on the history tutor and an audience of students, but is also subject to the digital

projection of image and voice, the arrangement and elevation of seating, internet connectivity, artificial lighting, hunger, thirst and many other agents besides.

A sociomaterial approach to learning spaces research, though, is not without its limitations according to Carvalho & Yeoman (2018). While acknowledging that it helpfully challenges the often-assumed neutrality of human action, Carvalho & Yeoman argue that an emphasis on the relations that exist between constituent parts of the assemblage means that sociomateriality stops short of revealing how the presence and arrangement of resources are implicated in educational practice. There is a parallel here with the wider critique that Mutch makes around applications of sociomateriality (2013) where he identifies an inadequate attention to the specifics of technological resources, combined with an under-consideration of broader social structures. While using sociomateriality to support their research into digital literacy practices of students, Knox & Bayne recognise Mutch's critique as they discourage us from viewing sociomateriality as an 'all seeing eye' for research (2013: 4). What is needed, Carvalho & Yeoman suggest, are analytical tools that build upon the conceptual foundations of sociomateriality. This is not about challenging the value of sociomateriality within learning spaces research, but simply about recognising what it can achieve in itself.

Sociomateriality, it should be remembered, is a 'sensibility' (Thompson 2012) and the common interest of range of social science theories (Fenwick et al. 2011), but not a discrete theory or method. As a way of supporting learning spaces research, a sociomaterial perspective can augment existing theoretical frames, underpin methodological work and provide a way of conceptualising those environments where educational activity takes place. Furthermore, when learning spaces research has often narrowed its gaze to focus on physical qualities and human practices, we should not underplay sociomateriality's ability to expose how these environments and activities are contingent on data flows, political climate, strategic priorities and a wider constellation of resources that have tended to be overlooked in education research (Fenwick et al. ibid). Sociomateriality, as Carvalho & Yeoman argue, does not provide the answers, but in the case of my own research, enabled me to take account of the often over-looked or invisible resources and interests that shaped the performance of learning space.

Space

A learning space, as defined in my introductory chapter, is any setting where educational activity takes place. As will become apparent in Chapter 4, the computer lab, classroom and corridor can be learning spaces, as can be the train carriage, the café and the comfortable surroundings of the student flat. We will also see that a learning space can simultaneously be a commercial, domestic and social setting. Learning spaces are configured and reconfigured through tangible objects, human actions and the invisible flow of data. They are shaped by politics, pedagogy and personal histories. They are experienced through sight, sound, touch and the imagination. In the pages that follow I want to discuss and critique the prominent themes within the growing discourse around learning space, including what the research can tell us about the relationship between digital technologies and those environments where educational activity takes place.

Although the classroom provides the setting for a wide range of educational inquiry, the discussion that follows is concerned with research that makes learning space the focus of its interest, rather than placing it as the backdrop to the performance of teaching and learning. At the same time, in line with the interests of this thesis, I have focused on research around the learning spaces of higher education, rather than those associated with other educational sectors. Compared with the number of studies and texts that have taken the school classroom as their subject, the university campus had attracted much less attention, prompting Scott-Webber et al. to remark that higher education learning spaces 'are a kind of final frontier of educational research' (2014:1). Nevertheless, with its own journal and a broadening body of work, the educational environments of the University are starting to be critically explored with more purpose.

Remodelling the campus

Since the turn of the century, millions of pounds have been spent modernising university campuses across and beyond the United Kingdom (Goodyear et al. 2018; Boddington & Boys 2011). These changes have often been characterised by the creation of flexible and informal learning spaces that are seen to better support contemporary thinking around constructivism, active learning and the needs of students (Boys 2011; Nordquist et al.

2011; Temple & Barnett; Oblinger 2006). The traditional library has evolved into a learning commons (Johnson & Khoo 2018; Lomas & Oblinger 2006) where students continue to read and research, but can also drop into computer clinics and congregate in study pods for group conversation. In other parts of the campus, the foyer areas of academic buildings are beginning to accommodate learning cafés (Coulson et al. 2015; Boys 2011) where students are encouraged to linger between lectures, recharging their batteries while browsing the course handbook on the university's learning management system. Meanwhile, the acquisition of movable partition screens and classroom furniture has gone some way to providing opportunities for the flexible and informal learning associated with contemporary teaching and learning (discussed for instance by Mulcahy et .al. 2015; Dugdale 2009). Beyond these predominantly pedagogical concerns, as UK universities have become accustomed to competing for students and funding, the use of glass, steel and stone in new campus projects has been used to nurture an institutional brand that, Neuman (2013) describes, is projected to audiences across and beyond the university.

None of this is to suggest, however, that the physical realm of the university has remained untouched since the ancient institutions received their charter several hundred years in the past. Where Jamieson suggests that, beyond some technological advances, university learning spaces have barely changed for several centuries (2003), we might consider how the gradual disciplinary broadening within the academy has altered the physical fabric of the campus. As higher education has embraced new subjects of study there has followed the construction of workshops, media studios, sports laboratories, performance spaces and a range of other learning environments. A visit to the offices of the Ancient City University archive gave me an immediate impression of an evolving and expanding campus, reflecting the wider changes that had taken place across the higher educational landscape over time. The compositional shift from paper to screen had seen open carrels squeezed out by computer bays, while concrete towers had for several decades cast a shadow over the cobbled streets that offered a centuries-old thoroughfare between academic buildings. Further afield, pasture had been transformed into parkland campus where the natural world was explored in clinical skills laboratories, wave tanks and other settings. What *is* widely accepted, however, is that learning spaces are undergoing a period of rapid and considerable change (Coulson et al. 2015; Mulcahy et al. 2015;

Boddinton and Boys 2011), prompting the emergence of 'a rich and rapidly growing area for research and scholarship' (Goodyear et al. 2018: 222) to which this thesis contributes.

Impetus for change

In common with what is reported across the literature, the creation of flexible learning spaces at Ancient City University was attached to a desire to match what were perceived to be the evolving needs of students, teachers and pedagogy itself. As this thesis unfolds, though, we will see that sociomateriality exposes how the design of institutional learning space is also shaped by profit, politics and corresponding institutional priorities and procurement practices. I have already noted that a significant impetus in the renovation of university campuses has been the fashion for active and constructivist learning (Mulcahy et al. 2015; Nordquist et al. 2011; Brooks 2011). The combined institutional and architectural response has included the construction of flexible classroom spaces, including what Oblinger describes as 'learning complexes' (2006) that can be adapted to support group work, while simultaneously reducing hierarchical power dynamics between staff and students. The library has similarly evolved with the creation of spaces dedicated to conversation and collaboration (Johnson & Khoo 2018), while retaining room for reading and quiet reflection. Sophisticated cafés have appeared across campuses and, in common with adjoining corridors, are designed to encourage ad hoc opportunities for dialogue (Coulson 2015; Boys 2011; Jamieson 2003). Meanwhile the erection of white boards has transformed the thoroughfare into a 'think stop' (Lomas & Oblinger 2006) where staff and students might congregate and collaborate (Oblinger 2006). As we will see in Chapter 5, the departmental café is a space to grab a coffee and catch up on email, while the corridor provides a passage between classes but also an avenue to improved understanding via the serendipitous coming-together with a colleague or course tutor.

The case for classroom design that supports student-centred pedagogy has often cited the demise of a traditional hierarchical model of teaching and knowledge construction (acknowledged by Carvalho & Yeoman 2018; Gourlay & Oliver 2016). The rigidity and power dynamics enacted by the lecture (Melhuish 2011; Jamieson 2000, 2003) have been superseded, it is suggested, by swivel chairs, smartboard technologies and student discussion. And yet, the remodelling of campus space has taken place alongside the

erection of new lecture theatres to accommodate growing student numbers (Boys 2011; Temple & Barnett 2007): a breezeblock-and-cement response to the ongoing expansion of higher education. Temple & Barnett further critique the constructivist momentum around learning space design when they ague that the lecture continues to hold value through its ability to induct new undergraduates into their chosen discipline. As I discuss in Chapter 5, the classroom-delivered lecture continued to hold a strong symbolic and practical allure for American History students, even when presented with possibility of accessing comparable academic content online. Therefore amid the critical and institutional enthusiasm for innovative and flexible learning modes and spaces, we should be wary of consigning conventional pedagogies (and their environments) to history.

A further influence over contemporary learning space design, as reported in the literature, has been the emergence of new digital technologies. This can be found in the discussion around flipped classroom pedagogy and hybrid learning spaces (discussed at length in Chapter 4), while smart boards, data projectors and other devices have become a common feature of the classroom. More significant, though, is the recognition that campus-wide connectivity and the ownership of digital devices has provided students with new levels of mobility and flexibility over where and when they learn (Carvalho et al. 2016; Temple 2008; Oblinger 2006). Writing almost half a century ago about the need for university learning spaces to evolve, Whisnant argued that the classroom provided the lecturer with an 'unfair advantage of almost unlimited freedom in his space' (1971: 92), as he enjoyed a choice of movement and expression that was denied to students seated still and quiet in the audience. Travel forward in time and access to digital devices, wifi and online academic content have provided new levels of spatial and learner independence. While there has been some interest in the way that digital technologies have helped to support or shape learning spaces beyond the campus (e.g. Gourlay & Oliver 2016; Bayne, Gallagher & Lamb 2013), as I argue in Chapter 4, there is greater scope to draw on work in mobile learning (see in particular De Souza E Silva & Frith 2013; Sharples et al. 2007; Kress & Pachler 2007). The significant contribution of mobile learning here is in recognising the distinct character of educational spaces (and practices) that exist beyond the campus, rather than seeing those settings as a satellite or networked extension of the physical university estate and its modes of pedagogy.

Conceptualising learning space

An important feature of the expanding body of work around learning environments is the recognition that we need to establish the nature of space itself. When digital technologies and pedagogies have contributed towards the dispersal of practices that were once rooted to the classroom or academic office there has been a shift away from seeing learning spaces as static containers of educational activity (Gourlay & Oliver 2016; Goodyear et al. 2016; Boys 2011; Leander et al. 2010). This is consistent with the sociomaterial understanding of space as proposed by Fenwick et al. when they describe how Cultural Historical Activity Theory enables us to 'break free from container-like notions of the classroom as a bounded context or a particular activity' (2011: 83). Instead, learning space is 'staged, performed or enacted in relations between bodies and material objects, including physical spaces' (Mulcahy 2018: 14).

This reconceptualisation of educational environments has been supported by philosophical work around the nature of space more broadly. Melhuish (2011) uses Bourdieu's concept of 'habitus' (1977) as a way of understanding the relationship between learning and space. The value of habitus to learning spaces inquiry, according to Melhuish, comes through its assertion that the environmental contexts that shape our lives depend on the interweaving of cultural, social and physical phenomena. As such, conceptualisations of learning space that foreground the actions of the teacher or learner are shown to inadequately account for the coming together of a wider range of interests and resources. This attention to the breadth and complexity of space is also apparent in Lefebvre's concept of the 'spatial triad' (1991) which informs Boys' research around creative learning spaces in post-compulsory education (2011). Boys argues that by applying Lefebvre's processes of association, analogy and metaphor to the setting of the educational environment, we are better able to expose the messy reality of learning space.

Lefebvre's theorising of space is also to be found in Leander et al.'s discussion around mobilities and the changing spaces of social learning (2010). Leander et al. describe how Lefebvre's work invites us to conceptually strip down the walls from our physical

surroundings in order to witness 'flows of energy of every kind' that expose how space is 'produced through ongoing movements', rather than neatly contained within a single location (2010: 332). We get a sense here of learning space being performed or 'enacted' as Mulcahy describes (2018). This is a conceptualisation that is particularly relevant to the discussion that follows in Chapters 4 and 6, as I discuss how students sought to negotiate personalised learning spaces, rather than accepting a pre-existing educational environment. Mulchahy draws on Massey's notion of spatial interrelations (2005) to suggest that we see space as 'constituted through interactions, from the immensity of the global to the intimately tiny' (2018: 17). Drawing on sociomaterial perspectives, Mulcahy argues that when learning space depends on the relations embedded in material practice, it exists in a state of perpetual production rather than ever being completed or closed. Massey's concept of the 'relations-between' also informs Acton's case for using sociomateriality in university physical spaces research (2017), when learning space can only exist through the constitution of material relations. This entanglement of human and non-human resources, earlier advanced by Latour (2005) and other proponents of Actor Network Theory, is applied to the learning spaces context by Boys (2016) as a way of describing the interweaving of spaces, artefacts and people within higher education.

As well as exposing the complexity of educational settings and practices, when these theorisations of space are brought together they offer a post-structuralist challenge to the boundaries and binary opposites that remain a feature of the discourse around learning spaces (and education research more generally). This includes the assumed distinction between learning that takes place on campus and online when, in practice, campus-registered students are also online learners. This was shown in my own research by Architecture students who made frequent use of online educational resources while ensconced in the design studio. The opposition to binary distinctions of space, particularly articulated by Lefebvre (1991), can also be used to question a tendency to distinguish between formal and informal educational spaces (see in particular the critique offered by Boys (2011) on this subject). As I will illustrate in Chapters 4 and 5, the screen-based activities of students in the design studio and lecture theatre exposed a shifting attention between academic, domestic and social activities in a way that problematises attempts to tidily categorise a space as either formal or informal. When a single setting accommodates

a range of spatial identities, a learning space can be seen to exist in 'fluidity and flux' (Bayne, Gallagher & Lamb 2013) rather than being defined either through a categorisation of practices or a composition of physical qualities. The conceptualisation of learning space as fluid does not deny the existence or influence of the brick and plaster that delineates the physical space of a computer lab or café, but instead discourages us from assuming that they are able to contain the flow of data or govern the practices that take place. Instead, using Fenwick et al.'s sociomaterial conceptualisation of the classroom (2011), we can see floorspace and partition boards as materialities that are implicated in the performance of an educational setting, in conjunction with a wider range of human and non-human agents.

Critically exploring learning space

Drawing on the conceptual work described here, a range of methodological approaches have been used to explore the learning spaces of higher education. Ethnographic studies have provided insights into the roles performed by learning spaces (e.g. Melhuish 2011) while interviews have investigated the attitudes and experiences of students and staff towards different educational settings (e.g. Carnell 2017). Elsewhere, Smith used layout diagrams to expose classroom power dynamics (2017) while Johnson and Khoo mapped human movement in order to understand learning space usage (2018). These different methodological approaches highlight how a range of human and non-human materialities are implicated in the performance of learning spaces and practices. Layout, wifi, beanbags, partition boards, projection screens and other phenomena have all been shown to influence those environments where educational activity takes place. What has tended be under-considered, however, is the way that university learning spaces are shaped by sound. In his work around creative learning spaces, Neuman (2013) calls for greater attention to acoustic design in campus architecture, for instance by examining the ways that furniture, walls and carpets directly affect speech intelligibility in the classroom. An interest in the relationship between sound and educational space can also be found in the work of Gershon (2011) and my own research around the sonic spaces of online students (Gallagher, Lamb & Bayne 2016), both of which are discussed below. Nevertheless, there has been a tendency to under-consider the critical value of the audible when research university learning spaces.

As it has grown, the learning spaces literature has started to support a reasonably varied range of inquiry, with recent examples including Carnell's study of the relationship between innovative pedagogy and the physical space of the university, which highlights the importance of joined-up dialogue between students and staff in designing a 'fit-for-purpose' estate (2017: 1). With particular relevance to the subject of this thesis meanwhile, Carvalho et al. recently reported on research which revealed how students:

> navigate the digital and physical realms of university spaces, the places they inhabit and value, their attachments to things, and how these, in turn, influence their feelings of inclusion, belonging, and learning purpose. (2018: 41).

Where Carvalho et. al were concerned with 'campus imaginaries' and the feelings of belonging among students, Smith focuses his attention on the spatial geometry of campus spaces, and how they influence interaction and engagement (2017). With a resonance to the discussion that will follow in Chapter 4, Smith draws attention to the ways that learning space design can alter the traditional hierarchies that exist in the classroom, thereby reiterating that a learning space is considerably more complex than simply being a setting where teachers teach and learners learn. The relationship between physical environment and power relations is also a feature of research by Acton that described how the soft-slope design of a lecture theatre, combined with the impetus of staff, engendered a more intimate relationship between students and staff. Acton's use of sociomateriality in this and other recent work (2017) is consistent with a growing recognition that the complexity of learning spaces can be better understood through an attention to the interweaving of human and non-human factors (see for example Ellis et al. 2018; Rooney & Nyström 2018).

In light of the considerable amount of resources that have been directed towards remodelling learning spaces across the last two decades (Mulchahy et al. 2015; Boddington & Boys 2011), what tends to be lacking in the literature is evidence that ties this work to educational impact. Writing more than a decade ago, Temple highlighted the absence of research that sought to establish a connection between campus redesign and academic performance (2007), even if learning outcomes or educational gains are difficult to measure. In a similar vein, Hunley & Schaller noted the eloquent case that had been

made to establish a relationship between educational space and educational activity, but argued that this had fallen short of identifying whether and how these settings were able to enhance learning (2006). Brooks has gone some way to addressing this gap in a study that established a relationship between physical environment and test scores (2011), while Beichner et al. (2007) are among those who have argued that active learning classrooms lead to improved educational outcomes. Elsewhere Boys & Hazlett (2014) propose that learning spaces might alternatively be evaluated through their ability to promote a sense of student belonging.

For the most part, however, evidence of a connection between learning space and learning outcomes has depended on small-scale studies and has generally not distinguished the learning environment from the mode of teaching or other variables. In its place, a rationale of flexibility and future-proofing has provided a vague and insufficient justification for the vast sums of money that have been spent on remodelling learning spaces (Goodyear et al. 2018). The effectiveness of learning spaces has more often been considered against an ability to meet the needs of learners (for recent examples see Zeivots & Schuck 2019; Morieson et al. 2018), sometimes measured through levels of student satisfaction with their surroundings (Harvey & Kenyon 2013; Eckert 2012; Scott-Webber et al. 2000). If the absence of research that connects learning space with learning outcomes seems surprising in light of the considerable investment that gone into the renovation of classrooms and other settings, in Chapter 5 I will suggest that it exposes the broader commercial, civic and strategic function of the campus. The university estate might be seen foremost as a place of teaching and learning, however it also projects an identity that can influence a range of internal and external audiences (Neuman 2013), potentially attracting the attention and fees of prospective students (Edwards 2000) who are vital to the institution's sustainability, as I will come on to discuss.

Searching for meaning beyond the campus

If the transformation of learning space has often been explored through the evolving form and function of the classroom and library, to a lesser degree there has also been an interest in those settings beyond the campus where students undertake writing, reading and research. Some of the same mobile technologies that have influenced the

remodelling of campus spaces have also been recognised as supporting opportunities for learning beyond the university (Carvalho et al. 2016; Nordquist & Laing 2015; Boys 2011). This is a situation, according to Dugdale, that demands greater attention from those charged with the design of learning spaces:

> Tomorrow's campus planning process needs to acknowledge that learning activity extends well beyond the edges of the campus, both physically and virtually. Now that students are enabled with mobile devices, they seek out those community places offering the late hours and blended settings that may not be available on campus. (Dugdale 2009:62)

The campus planning processes Dugdale refers to might reasonably be supported by the kind of research undertaken by Gourlay & Oliver (2016) around the physical and digital learning sites of postgraduate students, and my own research which investigated the learning spaces of fully online distance students (Bayne, Gallagher & Lamb 2013). Through the elicitation of visual and aural representations of personal learning spaces, supported by narrative interviews, we came to understand the complex ways that students sought to negotiate environments that were conducive to educational activity. This included the symbolic importance they attached to a physical campus they might never visit, reiterating Neuman's argument that the material fabric of the university holds considerable value to audiences beyond its everyday occupants (2013).

In light of the considerable strategic interest in distance education, research like that conducted by Gourlay & Oliver and Bayne et al. provides the university's strategic planners, estate managers and educational designers with a valuable reminder, if it were needed, that they are interacting with students who negotiate personal learning spaces in distinct and, as we will come to see, unconventional ways. What is it, for instance, that prompted Heidi Green to work on her history essay in a café just beyond the campus when there was an equivalent university-owned space across the street (Chapter 4)? And what was it about Edward Simpson's pristine apartment that made him long for the clutter of the Architecture School at the weekend (Chapter 6)? When universities actively support and create structures for learning beyond the campus (Dugdale 2009; Oblinger 2006), and learning experience is intimately connected with setting (Johnson & Khoo 2018;

Acton 2017; Boddington and Boys 2011), there is need for more research that tells us about the ways that students variously choose, negotiate and conceptualise personal learning space.

Sound

Sound is the vibrational movement of energy through air and matter, but is also a way of conveying emotion and meaning through spoken word and song. It is art to be savoured and noise to be abated. The presence and significance of sound reverberates across cultural contexts and disciplinary boundaries, as well as across time and space. Sonic practices and properties are the concern of architects and astronomers, medics and musicologists, and physicists and poets, alike. Sound is inextricably implicated in our meaning-making practices, enabling us to establish relationships and enact power (Daza & Gershon 2015), construct space (Cranny-Francis 2005) and understand and perform social actions (Maeder 2013). When we are immersed in a world of sound, listening helps us to make sense of our surroundings (Duffy 2017) and to interpret meaning from the invisible (Ihde 2012). Sound is also my focus for the remainder of this chapter. In the pages that follow I am going to consider the critical discussion that is taking place around sound in social research, with a particular emphasis on its relationship with education, space, and digital technology.

Sound within social research

The last two decades has seen a gradual awakening to the possibilities of using sound within social inquiry. Although it remains a niche approach within the broader repertoire of qualitative research, sonic materials, practices and methods have recently proven their worth in supporting questions around community, power, politics and other subjects. It is not that sound is entirely new to researchers: on the contrary, descriptions of the aural environment have for a long time been a feature of ethnographic writing. Furthermore, if we venture beyond those parts of the campus that are concerned with social inquiry, we will hear colleagues using sound in ways that are simultaneously creative and critical: Collings & Rawlinson's *Requiem for Edward Snowden* (2016); Pinder's sonic installations that situate memory alongside the modulating roar of urban traffic (2016); the expanding

collection of acoustic mapping projects described by Ouzonian (2014). In these and other examples, emphasis shifts to the production and performance of sound, rather than approaching the audible merely as data for inspection. It is only recently, however, that sonic material and practices have started to be placed centre stage within social research. This can be seen - and heard - in research taking place beneath the banners of acoustemology (Rice 2003), acoustigraphy (Kheshti 2009), anthropology of sound (Schulze 2016), ethnomusicology (Nettl 2005), sonic cartography (Gershon 2013) and sound studies (Sterne 2012). By directing their attention to sound, researchers have achieved a deeper understanding of hospital ward rituals (Rice 2003) and factory floor power relations (Supper & Bijsterveld 2015). We have gained new insights into the knowledge-making practices of scientists and engineers (Supper & Bijsterveld 2015) and the strategies that coerce shoppers to spend (Sterne 2005). Our social world has started to be scrutinised via voice (Alexander 2015), industrial noise (Bijsterveld 2012), the radio broadcast (Berland 2012), the iPod (Bull 2012) and repeatedly through the ringing of bells (Gershon 2011; Maeder 2013; Panopoulos 2003).

In light of the range of ways that sound has been used to investigate our surroundings, it is surprising that sonic material and practices have rarely featured within higher education research. In making the case for sound as educational systems, Gershon questions the 'scant study of sound in educational contexts either in or out of schools, other than as a distraction to learning' (2011: 67). And yet there *are* examples which point to the value of using sound as a form of inquiry. In her recent work around sound within multimodal composition (2018a), Ceraso guides the reader through University of Pittsburgh's *Cathedral of Learning* where she discusses the ability of sound to project the higher educational purpose of her surroundings. In some of my own research, sound provided a way of investigating the experiences and attitudes of online distance students (Bayne, Gallagher & Lamb 2013), which included the role of music in negotiating personal learning spaces (Gallagher, Lamb & Bayne 2016). For his part, Gershon has used what he describes as 'sonic cartography' to explore ideas of race and place within the urban school classroom (2003), as well as more generally arguing that an attention to the sociocultural character of sound provides us with insights into the construction of values in educational settings and the nature of meaning itself (2011). My own position, reflected

across this thesis (and discussed in detail in Chapter 3) is that sound carries its own critical and representational possibilities, albeit most commonly in conjunction with other materials and methods.

Much of the contemporary interest in sound acknowledges a debt to conceptual work from the second half of the last century, particularly that of Pierre Schaeffer and the *Studio d'Essai*, and the activities of R. Murray Schafer and his colleagues from the *World Soundscape Project* at Simon Fraser University. Pierre Schaeffer was an acoustician, cultural commentator and broadcaster, but is perhaps best known for conceiving 'musique concrète', an experimental approach to composition where raw materials replaced classical instruments. And yet he also found time to think critically about the nature of sounds and what he referred to the as 'l'objet sonore' - the sound object (discussed by Maeder 2013). In their own influential work around sonic effects and everyday sounds, Augoyard and Torgue (2005) argue that Schaeffer's concept of the sound object 'disrupted academic classifications of noise, sound, and music' thus creating 'a new musicology' as part of a broader 'phenomenology of the audible.' (2005:6).

Where Pierre Schaeffer has tended to be associated with experimental and philosophical work around the audible, Murray Schafer used sound to investigate the relationship between humans and their natural environment. From the 1960s onwards, Murray Schafer developed an 'acoustic ecology' that sought to explore the changing sonic character of our world, while arguing for greater levels of acoustic harmony with our surroundings. Murray Schafer is most often associated with co-creating the concept of the 'soundscape' (1994) as a way of referring to the component sounds of a particular setting (discussed in more detail below). This work, combined with that of Pierre Schaeffer, continues to resonate across the contemporary discourse, through its creation of a critical space where sonic material and practices can be foregrounded as we try to make sense of society and our surroundings.

The recently conceived fields of sonic research described above reflect a growing recognition that sonic materials and methods provide new ways of critically tuning-in to our social world: sound is more than mere background to life (Duffy 2017) and holds value

beyond its relationship with music and noise (Smith 2003). And yet, sound has tended to exist on the margins of qualitative research (Dicks et al. 2011), largely unheard within the 'ocular hegemony' of inquiry (Daza & Gershon 2015: 640). In a research-world dominated by what can be read and seen, there has been an absence of adequate methodology or mass of research to exploit the critical potential of the aural within social inquiry, rendering sound 'an untrodden field for methodological cultivation in the social sciences' (Bauer & Gaskell 2000:10). Maeder sets out a clear case for sonic methods, but acknowledges the view that sound will perpetually exist as an emerging field, obscured by more consolidated instruments of qualitative research (2013:2).

Pink similarly recognises the methodological value of sound but takes the position that it is likely to remain less well established compared to other forms of qualitative research (2009). The use of sonic methods is held back, it seems, by 'a lack of any real aural training in our culture' (Chion 2012:53), which for many centuries has privileged the legible over the aural (Attali 2012). For Bendix, listening remains largely unexplored within cultural scholarship (2012) while Van Leeuwen recognises the exciting, but as yet unfulfilled, potential of working with sound (2000). I want to argue, however, that the value of sonic methods can be measured through an ability to make a distinct contribution to social research, rather that in comparison with long-established language-based methods. When sound is always experienced in conjunction with other meaning-carry resources (McKee 2006), the research presented in this thesis approaches sonic methods within a broader repertoire of qualitative research, as I discuss in Chapter 3.

Space, noise, silence: conceptualising sound

Beneath any cultural, political or spatial meaning attached to the audible, there exists a scientific understanding that sound exists as waves of energy that permeate the atmosphere in which we live and the objects we create (Thompson 2012). As it travels, the vibrational movement of the sound wave 'amplifies and silences, contorts, distorts, and pushes against architecture' (Labelle 2012). At the same time the sound wave is absorbed, amplified and otherwise affected by any human, natural and material resources it encounters (Vannini et al. 2010). Sound is temporal in the way that it fluctuates and fades (Augoyard & Torgue 2005) and is spatial on account of its trajectory through air and matter

(Flügge 2011). Of most interest to my research, however, is the way that sound helps to shape the conceptualisation and practices associated with particular settings.

From the refugee camp (Boswall & Akash 2017) to the workplace of the daily newspaper (Macaulay & Crerar 1998), Murray Schafer's concept of the soundspace (1994) has been widely cited, adopted and adapted by researchers investigating the relations between sound and space. The sonic world, Murray Schafer argued, could be divided into keynote sounds (sounds listened to unconsciously, including those created by nature, such as water, wind and animals), signals (sounds which are foregrounded and listened to consciously, for instance alarm bells, whistles and sirens) and soundmarks (sounds that possess meanings specific to particular communities). The concept of the soundscape has been widely used across sonic research, for instance in supporting Kheshti's use of sound within ethnography (2009) and to link the sonic characteristics of a field site to wider social phenomena (Maeder 2013). In her work around personal sound space, Flügge recognises the value of the soundscape through its widespread application, for instance by those with a technical and scientific interest in environmental noise (2011). More problematic for Flügge, though, is the inability of the soundscape to accommodate the personal dynamics and auditory experiences that exist around sound. Where the notion of a soundscape encourages us to think of the common make-up of a particular physical space, Flügge instead argues that we sonically experience shared space in different ways. A further conceptualisation of sonic space is offered by Bull who argues that sound 'engulfs the spatial' and 'inhabits the subject just as the subject might be said to inhabit sound', (2003: 361) thereby challenging the delineation between the sonic, space and listener.

Rather than exploring the audible through the equivalence of a landscape, Augoyard & Torgue (2005) instead shift emphasis beyond what sounds are ('sparrow', 'eating', 'drills' from Murray Schafer's work), to what they do. In order to demonstrate how a single sound supports a range of different purposes and meanings, Augoyard & Torgue considered eighty-two everyday sounds from the perspectives of: physical and applied acoustics; architecture and urbanism; psychology and physiology of perception; sociology of everyday culture; musical and electroacoustic aesthetics; and textual and media expressions (2005:16). Applied to the learning spaces context, Augoyard & Torgue's

approach discourages us from making totalising assumptions around the aural character of a particular setting: on the contrary, a single sound, like a common learning space, is understood differently across a single group of occupants. This attention to the performative nature of sonic material can also be found in Vannini et al.'s proposition of the 'sound act', where a sound is 'endowed with dramatic significance' and 'the power to originate other moves in a complex ecology of communication' (2010:332). It also turns attention to the complex and subjective nature of **listening**, reflected in a range of typologies that attempt to describe how we hear our world.

Placing an emphasis on the listener as well as the ritual of listening, Adorno (1976) proposed a typology that, according to Supper & Bijsterveld, 'distinguishes figures such as experts, good listeners, culture consumers, emotional listeners and entertainment listeners' (2017: 127). Supper & Bijsterveld's own two-part typology, set out in their work around sonic skills in knowledge-making, considers the different ways of listening alongside the reasons for doing so, in order to demonstrate the importance of our ability to shift between listening modes as we attempt to make sense of our surroundings. Elsewhere, Chion (2012) distinguishes between causal listening, semantic listening and reduced listening in order to explain how we detect different aural phenomena within a shared setting. Chion's work is helpful from the learning spaces perspective in the way that it argues for the subjectivity and heterogeneity of sonic material, usefully reminding us to be wary of assigning a universal meaning to what is heard within the classroom, corridor or café (see Chapter 6). The combined effect of the typologies proposed by Adorno, Chion and Supper & Bijsterveld is to suggest the co-existence of different ways of listening, and differing types of listeners, with important implications for the assumptions that the social researcher is able to make about sound within a context (as I consider within my discussion of reflexivity in the next chapter).

Another approach to understanding listening has been to highlight how it differs from sight. Where the researcher can direct or focus her critical gaze upon particular visual qualities of the social world, the absence of 'ear lids' (Maeder 2013) means that hearing is not seen to carry equivalent powers of selection or an ability to 'stop the incessant exposure to sounds that need to be sorted' (Bendix 2012). The hearing organs remain

ever-alert to our surroundings, being active from the moment we wake, as well as the last of the senses to close down as we drift into sleep, according to Murray Schafer (1994). This implied absence of control is challenged by Bruyninckx (2012) who cites experiments in psychology of perception by Brand (1937) which pointed toward the subjective and individual quality of listening. Meanwhile Flügge argues that we selectively attune our ears to those sounds that are interesting (2011), while Sterne and Akiyama (2012) suggest that compared to the common description of vision as a 'focused sense', our ears can 'discern and parse multiple sounds simultaneously' (2012: 550). This was occasionally observed during my fieldwork when I witnessed seemingly disengaged students immediately become alert at the mention of their name by the class tutor.

The ability to listen selectively, or the 'cocktail party effect' (Cherry 1953), goes a considerable way to challenging the notion that listening is neutral and objective. When a sound wave penetrates the ear canal and ear drum it 'impinges on the human auditory system' and is transformed from a 'physical event' into an act of perception as we assign to it 'loudness, pitch, volume, density and complexity' (Bauer & Gaskell 2000:5). How the student understands and reacts to what is heard is shaped by her unique physical and neurological make-up, as well as her particular interests (Cranny-Francis 2005), and the social context in question (Bauer & Gaskell ibid). Therefore while sight and hearing work differently, from the perspective of social inquiry, we should not conflate the absence of 'earlids' with the inability of the learner or researcher to listen selectively.

The complex nature of sound is also apparent in the way that **noise** has been conceptualised. Noise has been of considerable interest to researchers working with sound, not least in the work of Murray Schafer and the *World Soundscape Project,* with its desire to confront noise pollution and encourage modern man to 'clear the sludge out of his ears' and restore his 'talent for clairaudience - clean hearing' (1994: 11). More than forty years after Murray Schafer began talking about the need to address the proliferation of noise, Bruyninckx (2012) described how it had become commonplace across the industrialised world, even if little work had been published tracing the story of its advance. Before addressing the problems of noise pollution however, there exists the challenge of defining what noise actually is. While the physicist might define noise as an integral part of

sound through its vibrational form, from a cultural perspective it is commonly regarded as an unpleasant or unwelcome sound: traffic, construction work, the barely audible buzz of modern technology and similar sonic material that Murray Schafer and his colleagues sought to confront. With her interest in how we individually use sound to construct or negotiate personal space, however, Flügge points towards the subjective and culturally-informed way that we classify particular sonic material as noise (2011). Therefore where Murray Schafer hears the unwelcome noise of 'air and gas inside metallic pipes, the rumbling and rattlings of engines breathing with obvious animal spirits, the rising and falling of pistons, the stridency of mechanical saws' (1994: 111), the same sounds might alternatively evoke nostalgia or reassurance, when one person's disturbing noise can be another's familiar background, in Flügge's view. This is a situation explained by Gershon who argues that:

> Noise is never simply noise but is instead some kind of sound that conveys socioculturally contextualized and embedded knowledge both about the source of the sound and its place in relation to the listener, both literally and metaphorically. (2011:71)

The subjective nature of noise was laid bare in my conversation with students around their music listening practices (see Chapter 6). Where Robbie Stanton would don his headphones to create an 'auditory bubble' (Bull 2005: 344) that muted the noisy distraction of background conversation, Edward Simpson instead drew pleasure and inspiration from what he regarded to be the collaborative sonic hubbub of the design studio.

Ancient City University's Theology Library, which we will visit at different times as this thesis unfolds, offered a contrasting sonic, physical and pedagogical setting to the design studio. It was here that Neville Smith would work on his history assignments, although not before putting in his ear buds as he sought to retreat into a world of silence, away from the whispered conversation of students and staff. But **silence**, like noise, is a contested concept. In everyday conversation, and often in critical discussion, silence is used to account for occasions and environments with an absence of sound. To suggest equivalent examples from my own research, this would include the hush that spread across the

lecture when Neil Jardine stepped towards the lectern, and the quiet that descended upon the design studio the day after the portfolio submission deadline. According to McKee (2006), silence demands our critical attention on the basis that is a fundamental element of sound, within voice, music and in its other forms. And yet the complete absence of noise or sound is an impossibility, in Attali's view, when life is rich with noise and 'death alone is silent' (2012: 30). This was apparent during my fieldwork where I spent time in designated silent spaces of the main university library. With discussion discouraged and digital devices on mute, it was still possible to hear the hiss of the air conditioning system and the sound of students shifting in their seats and shuffling between the stacks. Elsewhere, ear defenders might have prevented sound from permeating the ear canal of the stonemason repairing the exterior of Ancient City University's graduation hall, however the reverberation would become audible as it travelled through his body and into his ear drum.

In opposition to the possibility of silence, the embodied nature of sound has also been demonstrated through experiments in the anechoic chambers of university acoustics departments where researchers have been deeply unsettled by the deafening sound of their own bodies-at-work (Murray Schafer 1994; McKee 2006). From the perspective of the acoustic scientist there can never be silence, only the inability of a particular human or technological instrument to detect the low frequency movement of soundwaves through air or matter. The point I am making here is that, as Augoyard & Torgue demonstrated when considering sonic material from a range of disciplinary perspectives (2005), there is a need for nuance when talking about sound, listening and noise within social research.

Sound and digital technology

The growing critical interest in sound is closely tied to the increasingly technological nature of society itself, including the proliferation of machines with the ability to produce sound in its various forms (Cranny-Francis 2005; Maeder 2013). The availability of devices with the capability to document our surroundings, alongside the portability and malleability of recorded sounds, has contributed towards new listening and production practices that have become topics of critical interest. As I will discuss in Chapter 6, this includes the culture that exists around iPods and walkmans (Prior 2014; Hosokawa 2012),

including how they are used to establish individualised spaces within public settings (Bull 2005). From the research perspective, advances in audio recording technology (described by Bauer & Gaskell 2000, Maeder 2013; Makagon & Neumann 2009) have removed many of the practical difficulties of working with sound, even if they bring their own critical challenges. Maeder, for instance, highlights the limitations of devices that are configured towards capturing human voice over other sonic qualities of our world (2013), while Gallagher (2016) is among those who draw on contemporary work in new materialism to ask how we should conceptualise sound within an increasingly digital society. Emergent sonic technologies have also presented new approaches to the exposition and dissemination of research findings, whether through compact disc (Feld & Brenneis 2004), the creation and performance of sonic artefacts (Duffy 2017) or via sound art installations (e.g. Pinder 2014).

Discussing the value of working with audio recordings, Makagon & Neumann (2009) highlight opportunities for better engaging with the people and places that are being studied, while at the same time representing cultural life in ways beyond words. More recently, Lingold et al. (2018) have gathered a range of contemporary methods and pedagogies which combine digital technologies and sound within scholarship. This includes Ceraso's discussion of sonic practices in the humanities (2018b) and work by Rath that proposes 'ethnodigital sonics' as a way of creatively exploring historical experiences and attitudes of the past (2018). The variety and criticality of these and the previous examples of contemporary research demonstrate how sonic methods are particularly suited to drawing on the potentialities of the digital turn, according to Lingold et al. Therefore where the production of the printing press diminished the scholarly importance of the aural (Ong 1960), the creation of new digital devices and software, including their ability to gather, manipulate and reproduce sonic material, have contributed towards a critical awakening to sound within social inquiry.

Conclusion

In the opening remarks of this thesis I suggested that my research was arriving at a time of considerable critical and strategic interest in the relationship between digital technology and the learning spaces of higher education. It is my hope that the discussion of the

literature in this chapter has reiterated this point, while also making clear that there is scope for my work to make a distinct contribution. Across this chapter I have highlighted a lack of research around learning spaces beyond the campus. I have also suggested that sociomaterial approaches have a greater role to play in helping us to expose the complex nature of learning spaces, including their relations with digital technology. Finally, the discussion presented here has been a call to better recognise the value of sonic material in social research, something that will be discussed from a more practical perspective in the discussion of methods that is the subject of the next chapter.

Chapter 3: Methods

The opening stages of this thesis have offered a contextual and conceptual introduction to my research. I now want to spend time discussing the methodological approach that helped me to pursue the interests of my research and enabled me to make an original contribution to the body of knowledge considered in Chapter 2. Across the pages that follow I am going to explain my reasons for exploring learning space through sound, sight and spoken conversation. I will also describe the mechanics of my approach and the trajectory that my research followed. In the first part of this chapter I will set out the paradigmatic position that informed my research. This includes how I drew on sociomateriality, supported by work around speculative methods. Having already spent time arguing for the value of sociomateriality in critical work around learning spaces, the greater part of this chapter is given over to discussing what I did in my research and why. This begins with a discussion of my broadly ethnographic approach, including its relationship with sociomateriality. From there I go on to discuss how I generated and worked with the data, giving particular attention to the sonic methods that were a prominent part of my research. This chapter then draws to close with a reflexive consideration of my work.

A thematic and paradigmatic journey

The research presented across this thesis began with the purpose of exploring how assessment practice is affected by the pedagogical and societal shift to the digital. In particular I was interested in the ways that digital technologies supported opportunities for multimodal assessment. This research was to be informed by conceptual work in multimodality (Kress & Van Leeuwen 2001), combined with social semiotic theory (Halliday 1978) and supported by a social constructionist ontology (Berger & Luckmann 1966). While I have remained interested in multimodal scholarship (evidenced through the representational format of this thesis), and social constructionism shares some common ground with sociomateriality, the work I am presenting here is situated some distance from where my research began.

Consistent with one of the guiding principles of ethnography, I began my field work with a willingness to be guided by what I observed and experienced. This meant casting a wide net as I generated data, while being open to the significance and meaning of what I heard and saw. As I played back audio recordings and browsed through photographs and field notes, I began to ask how the presence and absence of technologies were implicated in educational activity. What, for instance, could I learn from the buzzing of the smartphone and the white noise of the data projector? Could meaning be found in the congregation of laptop users in particular parts of the History classroom, or the apparent tendency of Architecture students to accessorise with earphones? In looking to understand how students and staff assigned meaning to assessment, I had initially neglected to consider how these practices were also contingent on non-human resources.

Having earlier decided that a framework of multimodality, social semiotics and social constructionism was appropriate for investigating the actions and interests of the teacher and student, I felt it was less suited to recognising some of the non-human resources evident in educational settings. Digital technologies, I began to realise, were not the mere objects or instruments of assessment but were instead deeply implicated in educational practice. And what, I asked, about the wider materialities of the spaces where my fieldwork was taking place? What was the relationship between the hierarchical layout of the history classroom, the amplification of the tutor's voice and the nature of knowledge? What could the content and configuration of the design studio tell me about the ways that students and tutors collaborated in the construction of meaning in architecture? What was needed, then, was a conceptual framework that enabled me to situate the interests and actions of students and staff alongside the non-human materialities of the classroom. This was to be found in theories of sociomateriality, then articulated through new revised research questions and pursued during a second semester of field work.

Beyond the shift in interest and outlook described here, my research would go through a further significant change beyond the period of my fieldwork. As I moved between my data, the literature and some formative ideas, it became apparent that many of the most interesting and significant episodes and observations were closely bound to the spaces where learning had taken place. From classroom power relations to the listening practices

of students, via the roll-out of a lecture recording system and the introduction of online marking software, digital technologies were continually shown to exist in relation to the settings where educational activity was situated. As I distilled my ideas into arguments and sought to bring vignettes into a coherent thesis structure, it became clear that my research could make a contribution by exploring the relationship between digital technologies and the learning spaces of higher education. As I have already discussed in the previous chapter, my research has taken place at a time when there has been a growing critical and strategic interest in higher education learning spaces. What has been lacking, however, is a deep examination of the challenges that are provoked through the relationship between digital technology and learning space. It is widely established that networked content and mobile technologies bring new opportunities around where, when and how learning can take place. The optimism that is apparent in the discourse has rarely been accompanied, though, by a nuanced consideration of the way that the same resources that support pedagogic innovation and flexibility potentially contribute towards the commercialisation of educational spaces and practices. As such, shifting the emphasis of my thesis from the relationship between digital technologies and *assessment*, instead to digital technologies and *learning space*, provided an opportunity to make an original and valuable contribution to existing knowledge and scholarship.

Although this represented a considerable move away from the earliest advertised interest of my thesis, it was also an opportunity to build upon some of my previous work around learning spaces, discussed in the last chapter (Bayne, Gallagher & Lamb 2013; Gallagher, Lamb & Bayne 2016). The shift from assessment to learning space was less a clean break than an opportunity to extend one of my existing and most interesting research interests. I did not abandon my interest in multimodality but instead found space outside this thesis to advance my ideas, through postgraduate teaching, conference papers and journal articles exploring multimodal methodology (Lamb et al. 2018) and digital multimodal assessment (Lamb 2018). My continued interest in multimodality is also clear in the representational form of this thesis. Having taken the decision to direct this thesis towards learning space, it was natural that I would also make much greater use of sonic material and methods than had been previously been intended. Looking again to my earlier research around learning space, the importance of the audible had been clear as students

had sought to use or resist particular types of auditory material in order to configure or carve out individualised environments that were conducive to learning (Bayne, Gallagher& Lamb 2014; Gallagher, Lamb & Bayne 2016). More generally, my work around multimodal methods (Lamb et al. 2018) had made clear that we can better understand our physical surroundings through careful attention to the audible. As will become apparent, the use of field recordings and sound maps provided a way of examining power relations and epistemology in the classroom (Chapter 4), while the relationship between music listening practices and the negotiation of learning space is the focus of Chapter 6. There was less call to devise sonic methods to examine the commercialisation of university space (Chapter 5), however the use of field recordings remained prominent in the gathering and analysis of data, in juxtaposition with images and other materials.

Mess, speculation and not being slavish to methodology

Although enthusiastic about the paradigmatic and thematic realignment of my research, this was followed by a challenging period where I searched for an analytical approach that would support my interests. This included asking, for instance, whether ethnography's emphasis on human interest and action was compatible with the sociomaterial assemblage of human and non-human resources. I scanned the chapter summaries of research methods texts and worked through each of Saldaña's approaches to qualitative coding (2016) as I looked for a way of dealing with my data. Furthermore, where prior experience had encouraged me to make use of sonic methods, I found the education research literature to largely be silent on the subject. Over time I gradually came to recognise my approach as being overly slavish to orthodox methodology, a conclusion I reached through an introduction to the concept of method assemblage, alongside the creative emphasis of speculative research, that I now want to discuss.

Mess and the Method Assemblage

In *After Method: Mess in Social Science Research* (2004), Law sets out to confront and unsettle what he sees as the desire for social science research to impose order on a world that is messy and unpredictable. Where research is often characterised by clarity and complementarity, Law instead argues that it should embrace unpredictability. Rather than striving for 'definiteness' (p 25) that reduces the world to 'a set of identifiable processes' (p

5) through a ‘methodological version of auditing' (p 6), Law argues that research should seek to recognise the complexity of our social world. This methodological commitment to the untidy and unpredictable immediately suggested a good fit for my desire to explore an ‘education world that is a messy place, full of contradictions, richness, complexity, connectedness, conjunctions and disjunctions’ (Cohen et al. 2011). Law displays a particular ambivalence towards overtly strategic and practical conceptualisations of methodological work, where the researcher is ushered towards the security of tradition when she might be reflecting upon the nature of reality and her role in its production. Law’s belief in the ephemeral and irregular nature of our social word (2004: 3), according to Mills & Morton, helpfully reiterates that, ‘the ethnographic imagination is hard to standardise’ (2013: 11), thereby allowing for a range of different approaches as we seek to make sense of the complexity of classrooms and pedagogic practices. It was through this work that I halted my search through the methods catalogues for a ‘best fit’ and instead focused on what was significant and interesting about what I was hearing and seeing in the design studio and history classroom.

Moving beyond social inquiry’s devotion to process and order, Law adapted Deleuze & Guattari's assemblage (1988) to shift emphasis away from techniques that seek to uncover reality, to instead consider how a range of objects and interests enact multiple realities. In this framing, methodology is not simply concerned with techniques for generating data or the philosophy of method, but is about taking a position on what we understand reality to be and the way that, as researchers, our practices and presence are implicated in the performance of these realities (discussed below). Crucially for Law, the particular relations and objects within a method assemblage produces its own reality, rather than seeking to unearth pre-existing knowledge. This in turn supports the existence of multiple and potentially contradictory realities, predicated on the constituent objects and interests of each method assemblage. Whereas conventional social research has sought to establish the existence of a singular reality, the method assemblage sees reality as 'interactive, remade, indefinite and multiple’ (Law 2004:122). The method assemblage situates the researcher in a world where meaning is constructed through human and non-human agents, across moments of clarity, chaos and conflict.

Like Law, Fox & Alldred look beyond the human-centric conceptualisation of reality, instead proposing a methodological framework which assumes that the world is produced through an assemblage of the animate and inanimate (2015). Drawing particularly on Braidotti's work around posthumanism (2013), Fox & Alldred argue that the de-centring of human interest in favour of a system of shared agency with non-human material presents ontological and practical challenges for social research. This includes asking what we might understand as 'data' while unsettling the conventional privileging of the role of the (human) researcher as she looks to make sense of the world around her. Resources that previously existed in the background as the researcher sought to uncover the meaning behind human rituals and behaviours, are instead seen to exercise agency within a wider system of agents. Looking again to Deleuze & Guattari's conceptualisation of assemblage, Fox & Alldred repurpose research from the deployment of methods into an assemblage of affective flows. The constituent parts of the research assemblage exist through their interaction with each other, positioned in a state of flux in an open-ended world. The method assemblage is an event that itself demands to be scrutinised in order to understand how knowledge is produced through 'the materiality of the physical world and the social constructs of human thoughts and desires' (Fox & Alldred 2017:3), and how they affect each other.

The work of Law and Fox & Alldred fundamentally unsettles conventional social research in two ways. First, there is a need to broaden our understanding of data to include the material resources that affect, and are affected by, human agency. Second, applying a post-anthropocentric perspective to methodological work calls on the researcher to consider how she is implicated within the research assemblage and exists in relation to the 'paraphernalia of academic enquiry' (2015: 404). Humanistic assumptions of knowledge are thereby called into question by the entanglement of the material and the social. As will become apparent below, these questions prompted me to consider the sociomateriality of audio recordings and images that are central to my research, while also reflecting on the authorship that exists around this thesis. In terms of the trajectory of my research meanwhile, the work described here encouraged me to redirect my attention towards addressing relevant questions about contemporary education, a change in emphasis that

Fox & Alldred would regard as focusing on what methods can *do*, rather than what they are (2017).

Speculative method

This departure away from a methodological devotion to complementarity and order is also found in the speculative research advanced by Michael (2016) and Ross (2017). Once again combining sociomateriality with social inquiry, Michael argues that we can come to better understand our world through the unhinged routines and objects that are a feature of everyday life (2016: 646). This neatly captures the point in my research, described above, where I came to realise that a focus on human action told an incomplete story of what was taking place around the architect's desk and across the History student's computer screen. Where Law calls for methods that are sympathetic to the messy reality of our surroundings, Michael refers to the 'not-as-yet' when arguing for research that is oriented towards a social world characterised by complexity and flux. The term 'not yet-ness' suggests incompletion and uncertainty that hears Law's call to see method as simultaneously describing and producing a world that is in perpetual motion, rather than attempting to unearth a pre-existing reality. The concept of 'not-as-yet' is used in a different way by Collier & Ross (2017) where they argue that placing value on complexity and mess can bring nuance to critical work around digital pedagogy. Although concerned with educational practice rather than education research, their call for teachers to seek 'ways to engage with the digital on its own terms, rather than attempting to mask it with versions of more established practices that mimic the constraints of the classroom' (p 27) gave impetus to my plans to imaginatively design and align methods with my subject matter and the social world.

Ross has separately explored the role of speculative method in digital education research (2017) and, like Michael (2016), presents it as an alternative to the 'what works' agenda that seeks to measure educational gains while ignoring some of the vital questions around the changing nature of learning within networked society. Putting aside notions of compatibility and 'best practice', speculative method instead values the meaning within mess, while attempting to synchronise with the learning contexts that are to be investigated. Applied to my own research, this meant devising methods for generating

and working with data that were sympathetic to the subject matter, rather than attempting to match-up with established conventions around methodology. Where positivist and post-positivist research has often privileged scale, generalisability and reproducibility, speculative method and the method assemblage encourage imagination, experimentation and risk. Furthermore, by engaging participants in the research process, Michael et al. (2015) argue, speculative method is able to value the local and specific over a commitment to generalisability and transferability. Speculative method, therefore, usefully looks beyond the constraints of inherited social science research to instead encourage creative and collaborative approaches that are attuned to the particularities of our networked, complex and open-ended world. This emphasis on creativity and collaboration encouraged me towards the use of digital sociomaterial journaling and ethnographic playlists described below. The method assemblage, meanwhile, prompted me to think about the nature of data itself.

The sociomateriality of digital data

A central assumption of ethnography is that the practices of observation and description generate a reality that is shaped by the researcher's own interests and history. I want to suggest, however, that when ethnography is combined with a sociomaterial sensibility there is a need to consider how these activities are contingent on a wider repertoire of non-human resources. The method assemblage raises questions about the nature of my sonic and photographic data and their relationship with the reality experienced in the field. In everyday conversation we casually refer to the way that a photograph manages to 'capture a moment'. The sound of the closing shutter suggests that a panorama or set of practices have been frozen in time and preserved on an SD card. At some point afterwards we might study or share the image, telling ourselves or others, 'this is how it was'. A more nuanced understanding of the photograph can be found in work around visual methodology, for instance when Rose argues that the photograph does not contain an 'essential truth' that is waiting to be unearthed by the researcher (2012: xviii). Meanwhile, Hammersley & Atkinson recognise the tendency to think of the video or photograph as 'producing faithful, realistic images of the world about us' when in reality 'these forms of representation are partial' (2007:148), not least through the way that they are shaped by the researcher's interests. What has tended be to be under-considered, though, is the way

that digital technologies subtly but profoundly alter what is documented and then displayed on screen. Lens quality and processing power help to shape what the digital camera sees and records, beyond the interests of the researcher behind the viewing window. According to the visual culture theorist Nicholas Mirzoeff, the complexity and sophistication behind the creation of the digital photograph is so distinct from the workings of the conventional camera that we should understand their output as 'images' rather than photographs at all (2015). Extending Mirzoeff's argument, the technologies used to store, edit and then display an image each represent a further stage of separation from what was seen in the moment. The relevance of these ideas to methodology is in discouraging us from assuming that the camera extracts and replicates a reality that was experienced in the field. This does not diminish the value of the photograph, but simply reiterates Law's argument that we need to recognise the existence of different realities (2004), shaped for instance by human, technological and other interests that coalesce in the production of the image.

The same can be said of the sonic data within my research. As I described in the last chapter, before a wave of sonic energy can reach the ear canal - or the uni-directional microphone of my audio recorder - it may have been reshaped through amplification technologies, classroom acoustics, the absorbent qualities of carpet and furniture, and the presence of other human and non-human bodies. The recorded sound would then be digitally-unpacked and reconfigured (Sterne 2006) based upon the particular algorithmic biases and capabilities of my Zoom H1 and its built-in software. In his methodological discussion around the analysis of sounds, Maeder (2013) notes the varying capabilities of the audio device and how this can influence what the researcher is able to record and reproduce for subsequent analysis. This was particularly apparent at the point during my fieldwork when I bought a set of SIVGA SV005 headphones to replace my iPhone ear buds. The enhanced audio reproducing qualities of these specialist headphones immediately opened my ears to content within field recordings that I had not previously detected. The point I am making here is that the field recordings and photographs that can be heard and seen across this thesis offer a representation, but not an exact record, of the learning spaces where my fieldwork took place.

The presentation and interpretation of the ethnographic monograph is always subject to the interests and disposition of the researcher and its audience, but at the same time is entangled with a wider range of material resources. As Fox & Alldred (2015) and Law (2004) argue, data should not be understood as fragments of a pre-existing reality waiting to be unearthed, and neither do they emerge through the researcher's interpretation. Rather, the field recordings and photographs presented in the chapters that follow offer a reality shaped by my actions and interests, but relational to a much wider repertoire of technological, commercial and other agents. There is a clear parallel here with the work of Thompson & Adams who draw on Actor Network Theory to expose the hidden materialities of research practice (2013). In a theme I will revisit later in this chapter, Thompson & Adams argue that, from a sociomaterial perspective, technologies need to be understood as co-researchers. I also want to suggest that this raises questions about the overtly human-centric conceptualisation of ethnography.

Ethnography through sound, images and words

Ethnography has become firmly established as a way of investigating educational settings, often traced back to work by Hargreaves (1967), Lacey (1970) and Lambart (1976) in the UK school system. With an eye to the interests of my own research, ethnographic studies have recently explored attitudes towards classroom technologies (Tummons et al. 2016), student interaction within the setting of the campus canteen (Spiteri 2014), the materiality of educational space (Roehl 2012) and the complexity of practices undertaken by academic staff (Ruth 2015). As I will discuss in the next chapter, my ethnographic field work took place within a range of settings across and beyond the Ancient University Campus. Taking advantage of the methodological potentialities of digital technology I combined a traditional observational approach with the generation of audio recordings and photographs. These data, including the materials submitted by students within the digital journaling exercise, are summarised in the table below. To this we can add 20 semi-structured interviews with staff and students, discussed in more detail later in this chapter.

Data type	Description
Field recordings (audio)	136 audio recordings in WAV. and MP3. format, generated using a Zoom H1 and iPhone SE. These varied in length from a single minute to longer than an hour. A further 56 recordings were submitted by students during the digital sociomaterial journaling exercise.
Photographs	2556 photographs generated using a Panasonic LUMIX DMC-TZ70 and iPhone SE. A further 77 photographs were submitted by students during the digital journaling exercise.
Field notes	Typed notes generated as I observed students across and beyond campus. These were created using Pages software on a 2015 Macbook AIR.
Course documentation	Digital and paper materials relating to the American History and Architectural Design courses. Included course handbooks, tutorial outlines, lecture slides, assessment briefs, feedback sheets and classroom handouts.
Institutional documentation	Digital documentation and web-based content including: annual reports; strategy plans; minutes from meetings; learning technology schematics and results of staff and student surveys of learning spaces.

Summary of data and documentation

Ethnography, sociomateriality and learning spaces research

Although ethnography is firmly established within education research, in light of its contested nature I want to spend time setting out my own position. Ethnography is commonly used to refer to the study of peoples, rituals and societies through observation and description, or what Fetterman refers to as 'the art and science of describing a group or culture' (1998: 1). However beyond this broad conceptualisation there is a lack of consensus over how ethnographic work should be undertaken (Hammersley & Atkinson 2007) as it has been adapted to suit the interests and epistemologies of different

disciplines and researchers (Mills & Morton 2013). Recognising this contested ground, Green & Bloome (1997) take the pragmatic position that we should accept ethnography as being able to accommodate different interpretations and uses. According to Green & Bloome this can extend from a traditional approach where the researcher spends lengthy periods immersed in the field, to the use of ethnographic tools within a wider repertoire of qualitative methods. My own approach was situated somewhere between these positions as I adopted what Forsey (2008) describes as an 'ethnographic sensibility', without ever seeking to become a fully involved community member. As I wanted to simultaneously observe and compare two different undergraduate courses, I was not in a position to undertake the kind of participant observation that is much prized in ethnography where, through large periods of time spent in a chosen field site, the researcher becomes embedded within a single community. At the same time I used a range of qualitative methods that might not typically be associated with ethnography. It is for this reason that I describe taking a 'broadly ethnographic and qualitative approach'.

Beyond the contested methodological ground described above, I want to suggest that textbook definitions of ethnography are often limited by their human-centric focus on rituals, cultures and societies. This is not to suggest that people and practices are not central to the ethnographer's work, only that this framing underplays how material resources shape our educational spaces and practices. As will become clear from Chapter 4 onwards, tangible digital devices and invisible traces of data were as significant to the negotiation of learning spaces as the actions and attitudes of students and tutors in those settings. Through a sociomaterial attention to the non-human resources that are often overlooked in education research (Fenwick et al. 2011), the ethnographer is better able to understand the practices of the student and teacher. This compatibility is notably found in Latour & Woolgar's study of the routines of the science laboratory (1979) which helped to shape the articulation of sociomateriality itself. That sociomateriality can support education research in particular is demonstrated through recent work by Vanden Buverie & Simons (2017), Tummons et al. (2016) and Roehl (2012) all of which broaden critical interest beyond human actions and interests in order to better understand what takes place in and around the classroom.

‘Observation’ through sight and sound

The practice of observing is widely seen to be one of the cornerstones of ethnography. Through observation we might come to better understand the reorganisation of universities (Friberg 2015) and the rituals of the academic office (Ruth 2015), while also finding new ways of thinking about assessment (Hill 2009) and the relations between learning spaces and practices (Brook 2012). It is a term that I have found problematic, however, in light of the symbolic privileging of the visual, when my own research has just as often turned towards sound (albeit always in conjunction with other types of data). This emphasis on meaning-through-seeing is reinforced by references to ‘insight’, ‘outlook’, ‘focus’, ‘perspective’ and other ocular-centric language within the research vocabulary. As work in sensory ethnography (Pink 2009) and multimodality (Jewitt 2009) makes clear, sight never exists in isolation but rather in combination with sound, touch, taste and other meaning-making forms. And yet, despite the emergence of sonic ethnography (Kheshti 2009) and an anthropology of sound (Schulze 2016), the language of research mirrors the centuries-long privileging of what can be seen over what is heard (Mirzoeff 2015). For the purpose of clarity then, and in the absence of a suitable alternative, I have referred to ‘observing’ and ‘observation’ within this thesis, even thought sight has always existed in conjunction with sound and other meaning-carrying materials.

When sound has tended to exist on the margins of qualitative research (Dicks et al. 2011) and has been under-used to investigate the nature of higher education (Gershon 2011), I want to briefly introduce the practice of field recording and how it differs from documenting spoken conversation. For the most part, field recording is undertaken with the purpose of identifying the audible qualities of a setting, perhaps with a view to interpreting meaning from that environment. The research value of field recording is set out by Gallagher, who invites us to understood these materials as:

> audio recordings of the varied sounds of the world, produced outside of acoustically controlled spaces. As a research method, field recording offers intriguing possibilities for researchers interested in the sonic aspects of spaces and places. (2015: 2).

By referring to the 'acoustically-controlled spaces' in which these materials are generated, Gallagher draws a helpful distinction with interview recordings that take a narrower and more managed approach to the audible. Where voice recording is primarily focused on what is said (and perhaps also how it is said), the field recording remains open to the wider range of audible material (even if a limitation of many audio devices, according to Maeder (2013) is the way they are designed to capture human voice over other sounds). Using the example of my own research, when I took out my audio recorder in the design studio I was sometimes interested in documenting spoken conversation but never to the exclusion of the rustling of paper, squeaking of chairs, tapping of computer keys and other sounds that had a considerable amount to say about the learning spaces and practices of Architecture students. Considered from a sociomaterial perspective, the interview recording limits its attention to human voice, while the field recording seeks out the wider range of human and non-human actors that co-exist in any learning space.

The generation of audio data in my research was made possible by recent technological advances in the recording and storage of high quality audio, discussed for instance by Maeder (2013) and Makagon & Neumann (2009). With a single click of the record button on my Zoom H1 I was able to document more than 30 hours of sound in high quality Waveform Audio File (WAV.) format. On other occasions I used the voice memo function on my iPhone SE, normally when making ad hoc visits to the Architecture School.

Recording the sounds of the lecture theatre with a Zoom H1

Although sonic methods largely exist at the boundary of social and education research, in our increasingly image-mediated world (Mirzoeff 2015), new visual methodologies have emerged that foreground the critical value of the image as a way of interrogating our social surroundings (see Rose (2012) for an overview). Although anthropological work has always depended on what the researcher was able to see, the emergence of a visual ethnography (see in particular Pink 2013) reflects a growing interest in the use of images, while also broadening the descriptive possibilities of ethnography beyond the printed word. In my own research, photographs became a vital way of documenting what was observed and experienced across a range of learning spaces. Nearly all of the photographs presented across this thesis were generated using a Panasonic Lumix DMC-TZ70, although during ad hoc visits I sometimes used the camera on my iPhone SE. Looking at the metadata for images submitted within the digital journaling exercise, students nearly always used smartphones to document their learning spaces.

Where the generation of sonic data essentially involved deciding when to start and stop recording, in the case of photographs I had to decide where to point the camera, whether I should use the zoom to foreground some phenomena and exclude others, and other questions. To touch on some of the most important issues, camera angle was mostly governed by where I took a seat at the beginning of the American History class, although in the case of Architectural Design I was able to move around more freely and would try to negotiate a space between people, paper and plaster models. Other than when using close-ups or taking photographs in gloomy conditions I avoided using my camera's built-in filters as I felt this would bring a further level of interpretation to the data. Likewise, other than for the purpose of anonymity, cropping or clarity, I avoided using the wide range of editing features in Photoshop.

Video as an alternative approach to generating data

Having explained that audio recordings and photographs have featured prominently in my research, I want to explain why I did not combine the generation of these data through the use of video. First, my earlier research around the learning spaces of online distance students (Bayne, Gallagher & Lamb 2013) had proven the critical and methodological potential of generating discrete pieces of sonic and photographic data. At the same time

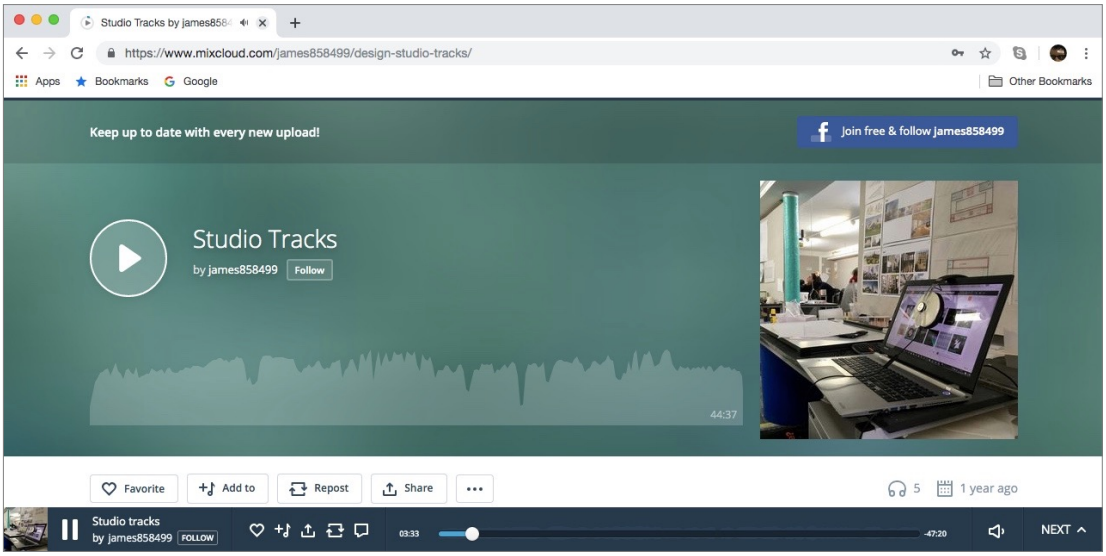
video recording, like any data-generating method, carries its own limitations. Although video increases the range of data that can be simultaneously generated, like the photograph, it still falls on the researcher to decide where to point the camera and the phenomena that need to fall by the way-side (Dicks et al. 2011). Just as the photograph documents a scene that halts at its outer margin, the ethnographer who searches for meaning through the viewing window of the video camera experiences a 4:3 aspect ratio reality. And in common with the generation of field recordings, video recording calls on the researcher to decide when to start and stop recording. Beyond these questions, prior teaching experience had shown me how the presence of a video camera could cause anxiety in the classroom, particularly on those occasions where students were expected to talk about their work: this would have been counter to my wish to avoid disrupting the educational experience of participants (discussed below)

Digital sociomaterial journaling

On the basis that digital technologies and pedagogies have increasingly enabled educational activity to disperse beyond the classroom and campus, it was important that my research should explore the impromptu and individualised learning spaces outside the History Department and Architecture School. To do this I devised an approach I called 'digital sociomaterial journaling' that drew on my earlier work around the elicitation of multimodal postcards (Bayne, Gallagher & Lamb 2013), and the longitudinal multimodal journaling of Gourlay & Oliver (2016). For the duration of a week, five students from each course were asked to document the settings where they worked on impending assignments. Where Gourlay & Oliver invited students to use diary and drawing methods as a way of examining their digital literacy practices across different settings, I encouraged participants to document each learning space through an audio recording, a photograph and then a short explanatory description (see Appendix 1). These 'postcards' were then submitted using a form on my research website, although to make participation as simple as possible I also accepted data via e-mail and USB.

While this approach drew heavily on my earlier use of multimodal postcards, the significant difference came through inviting students to generate data in all of their different learning spaces across a week, rather than selecting a single representational

setting. This activity generated 77 postcards featuring a range of learning spaces, many of them in domestic, transitory or impromptu settings that would have been difficult to document through more conventional observation. Although every postcard included a photograph and a text description, in a small number of instances the audio was absent or suffered from static that reduced the clarity of the recording. Although this had a negligible impact when considered across the wider body of submitted data, it does reiterate the point I made in the previous chapter that the generation of sound is less-well rehearsed compared with the visual and textual forms. To support comparison and reference, I collated the data from each postcard in a spreadsheet, with audio recordings, photographs and textual descriptions sitting in juxtaposition within columns (see Appendix 2). These data, as I will discuss in the next chapter, went a considerable way to exposing the fluid and negotiated nature of learning space.



Screen shot from the Architectural Design playlist hosted on Mixcloud

Collaborative playlists as speculative method

In Chapter 1 I argued that my creation of music playlists makes an original methodological contribution. Here I describe the rationale and mechanics of this approach, and how the playlists worked as ethnographic artefacts. I was emboldened to develop this method having previously seen how online distance students used music to create learning space (Gallagher, Lamb & Bayne 2016), but also through the *Elektronicshes Lernen Muzik* project

(https://www.elernenmuzik.net/) where, since 2012, I have invited educators to share and discuss 'learning playlists' (see Bayne et al. forthcoming). I was further encouraged by work in speculative method, described above, particularly Ross' emphasis on digital, creative and collaborative ways of generating data (2017). In summary, this method saw me working with students to create a playlist of the music they listened to while engaged in course-related activity. Using a form on my research website (see Appendix 3), students were invited to nominate individual pieces of music, alongside a short explanation of how they felt it contributed towards their learning. On other occasions students offered suggestions during conversation or shared screen shots of their 'go to' study playlists. This exercise captured the imagination of both groups, with 15 students nominating songs, which I then used to create a playlist for each course. I created these playlists using Sound Studio software, before uploading them to my Mixcloud account (where copyright is appropriately covered). Sharing these playlists with students and staff helped to build rapport and in some cases also emerged as a useful conversation prompt during interview. These playlists are reproduced in Chapter 6, alongside a discussion of the insights they provoked into the ways that students used streamed music services to negotiate personalised learning spaces.

Interviewing students and staff

The final stage of data collection comprised twenty semi-structured interviews with five students and five tutors from each course. To an extent my use of interviews went against the grain of ethnographic research, which I want to briefly discuss. When a researcher may have spent a considerable amount of time working hard to establish an easy rapport with participants, the structure and formality of the interview can be seen as a backwards step. Hammersley & Akinson for instance describe how some ethnographers view the 'soliticited account' (2007:1001) of the interview as less valid than spontaneous conversation, even if they do not take that position themselves. In response to these challenges Forsey proposes that interviews can be undertaken with an 'ethnographic sensibility' (p 59), enabling us to make sense of the 'beliefs and values, as well as the material and structural influences' of the research participant's existence (p 66). I would also suggest there is no reason why interviews should be defined by rigidity any more than ethnographic fieldwork cannot benefit from structure and moments of formality. As it

was, my interviews were characterised by the same tone that that had been established with students and staff during the preceding fieldwork. This table offers a descriptive overview of the interviews that took place:

Date	Participant and status	Location
15 May 2017	Sandy McFall, student, Architectural Design	Café
16 May 2017	Matthew Redfearn, student, Architectural Design	Café
16 May 2017	Edward Simpson, student, Architectural Design	Café
23 May 2017	Debbie Harris, student, American History	Café
23 May 2017	John Brown, student, American History	Café
24 May 2017	Neville Smith, student, American History	Café
24 May 2017	Heidi Green, student, American History	Student Union
26 May 2017	Robbie Stanton, student, Architectural Design	Café
26 May 2017	Yvonne Fisher, student, Architectural Design	Café
29 May 2017	Ella Ness, student, American History	Café
14 June 2017	Neil Jardine, tutor, American History	Private office
19 June 2017	Victor Marsh, tutor, Architectural Design	Café
20 June 2017	Isobel Law, tutor, Architectural Design	Café
23 June 2017	David Marks, tutor, American History	Private office
23 June 2017	Evelyn Hopkins, tutor, American History	Café
26 June 2017	Timothy Stone, tutor, American History	Private office
30 June 2017	Charles Hart, tutor, American History	Private office
4 July 2017	Graham Locke, tutor, Architectural Design	Café
25 July 2017	Olivia Yates, tutor, Architectural Design	Café
28 Aug 2017	Richard Gates, tutor, Architectural Design	Café

Interview dates, participants and settings

Beginning with the students who participated in the digital journaling exercise, interviews took place soon after teaching had concluded for the academic year. Over the summer I then interviewed the ten members of academic staff with whom I had spent most time. The location for each interview was selected by the participant, with an eye to their convenience and also to help them feel at ease through the familiarity of their surroundings (Hammersley & Atkinson 2007). With the exception of four American History tutors who requested to be interviewed in their offices, interviews took place in cafés, mostly in close proximity to Ancient City University campus. I recorded these interviews using my Zoom H1, while at the same time generating a back-up copy on my Macbook. Later each day I transferred these files to a separate external hard drive before deleting them from each device. I took a semi-structured approach during interviews, with participants being encouraged to talk about their learning spaces and practices, but also having room to surface what they felt was significant or interesting. Appendices 4 and 5 provide examples of interview schedules for students and staff.

In each interview I used photographs from my fieldwork to prompt discussion and reflection. The photo-elicitation interview has become an established part of participatory ethnography according to Pink (2013), helped by the possibility of generating types of knowledge that might not be gained through observation (Hammersley & Atkinson 2007). There was also a practical reason behind taking this approach: when interviews were taking place almost a year after the beginning of my fieldwork I felt that photographs might usefully jog a participant's memory (see Forsey 2008). Prior to interview I selected photographs that would be directly relevant to the corresponding student or tutor. In the case of students this included the photographs submitted within the journaling exercise. It had also initially been my intention to provoke reflection by inviting students to listen back to the field recordings they had contributed, however I later decided this would both disrupt and unduly extend discussion. Instead, I drew on my own transcription of the audio data to prompt conversation. Nevertheless, in light of my desire to explore the critical possibilities of sound, the decision not to provoke interview conversation by playing audio recording feels in hindsight to have been a missed opportunity.

Working with the data

If the structure of this chapter suggests that my research unfolded as a series of distinct stages, in fact it was characterised by to-ing and fro-ing between activities. This was necessarily the case since my research interests evolved during the first semester of field work, as described above. At times I was simultaneously exploring the published research, articulating new questions, generating data and sketching out the arguments I wanted to make. Although my fieldwork nominally drew to a close with the conclusion of the academic year, I later went back to staff and students to clarify points that had emerged during observation or interview. Furthermore, as I began to make sense of the relationship between digital technology and learning spaces, I met with additional staff from Ancient City University who held a remit for the procurement and installation of classroom technologies, and other colleagues responsible for the design of campus spaces. Where it might be more conventional for a researcher to commit either to an inductive or deductive approach, as I iteratively moved between questions provoked by the literature, and ideas that emerged from my openness to what was experienced in the field, I situated myself somewhere between these positions. Again, while this approach might not cohere with textbook approaches to methodology, it aligns with the commitment of the method assemblage to undertaking inquiry that is foremost concerned with asking relevant questions in a meaningful way.

Working across the data

By the time that I pressed 'stop and save' at the end of my 20th interview I already had a considerable familiarity with much of the generated data. This had come through repeatedly listening to audio recordings, browsing through photographs and flicking through written notes while my fieldwork was ongoing. Furthermore, from an early stage of my data collection I had been testing out ideas during conference presentations and in my research blog. Although some of these arguments would fall to the wayside as my interest moved away from multimodal assessment, the time I had spent studying the data would shape my thinking around sociomateriality and learning spaces. When a considerable amount of the data comprised audio recordings and photographs it felt natural to bring these resources together as a way documenting and trying to understand

what I was observing. Several of the composite videos shared across this thesis emerged from that earlier work. In order to 'get close' to the interview data meanwhile, I added the recordings to my iPhone, enabling me to listen to students and staff discussing their learning spaces and practices as I travelled to and from the university each day.

As my fieldwork had generated a range of different data types (sound recordings, photographs, typed notes, interviews, documentation) I decided to work across the entirety of this material as I searched for emergent themes. For the most part I did not attempt to transcribe each interview and photograph, although I used an approach equivalent to transcription when working with sound (described below). While written transcription can help the researcher gain a clearer understanding of his or her data, it is neither necessary nor feasible in every case (Robson 2011). Instead, as Ross (2017) and Michael (2016) argue in advancing the case for speculative method, it can justifiably fall to the researcher to devise a research approach that responds to what is distinct about the data and suited to the subject being investigated. I did though find it helpful to make a breakdown summary of each interview in table form (see Appendix 6) that I was able to use as a reference point. Working across the full body of research material, I created and then refined what I felt to be the significant emergent themes, recorded in a lengthy and constantly evolving spreadsheet. I then considered whether and how each theme was evidenced in the different data types, each of which was represented in its own column within my spreadsheet. At its broadest point I had forty emergent themes, although over time this was distilled into a short outline setting out the structure and central arguments presented in this thesis.

Sound maps as sonic transcription

In its simplest form the sound map makes a connection between audible material and physical location. In her work around multimedia and methodology, Cranny-Francis describes how the sound map features within architecture education, using the examples of students attempting to account for the audible characteristics of a geographical area (2005). A different kind of sound map is used within the sound walk, where the student or researcher's attention is directed towards 'unusual sounds and ambiances' that help to expose the sonic character of a given area (Murray Schafer 1994: 213). Elsewhere Gershon

builds on the storytelling potential of maps to propose 'sonic cartography' as a way of exploring identity and race within the school setting (2013). Gershon is less concerned with assigning sounds to specific physical locations than exploring how the audible qualities of the school environment can expose the 'ephemeral flux of daily interactions' as the learner negotiates his identity across a range of spaces and places (p 40).

My own use of sound maps, which borrows something from each of these approaches, began as a form of a transcription as I sought a way of situating recurring sounds against corresponding parts of the classroom. When educational activity took place across a range of impromptu spaces within and beyond the campus, this was never going to be an exhaustive exercise. Instead, I focused on producing detailed maps of the lecture theatre and design studio that are synonymous with History and Architecture education respectively. Listening to my audio recordings in conjunction with photographs and field notes, I identified the most frequently documented sounds for each of these settings. This was helped by the summaries I had prepared for each of the field recordings (see Appendix 7 for an example). I then drew out a simplified floor plan for each teaching space, based upon architectural drawings. Using a print-out of each of my floor plans I then marked the sounds against an appropriate location of the design studio or lecture theatre. In light of the fluid nature of sonic material (discussed in the previous chapter) I situated each sound against the location from where it was generated (amplification speaker, lecturer, ventilation column etc) rather than attempting to acknowledge the entire area it would have dispersed across (which would have required a considerably more complex approach to generating data). With representative sounds mapped against each floor plan I then went back to my data to identity appropriate field recordings, which I trimmed to clips of around 10 seconds in length. When each field recording contained a range of audible content I assigned an appropriate photographs to denote the particular sound in each case. The final stage involved uploading each floor plan to Thinglink before adding each video into an appropriate part of the classroom. These sound maps, and the insights they provided into the relationship between digital technologies and learning space, are presented in Chapter 4.

Recruitment, ethics and reflexivity

Recruiting students to participate in my research

The recruitment of research participants was initially shaped by course structure combined with the advice of coordinating tutors. By electing to spend time in the full range of teaching spaces associated with each course, the entire cohort of 300 American History students and 140 of their counterparts from Architectural Design participated in my research to some degree. Beyond the large class setting of the lecture and pecha kucha (discussed in Chapter 4), I spent a considerable amount of time working with tutorial groups of 11 American History and 13 Architectural Design students. Every Friday morning the entire Architectural Design class would assemble for tutorials in partitioned bays that ran the length of the studio. Across the first semester I visited all the bays in order to observe different learning practices and environments. While useful in highlighting the heterogeneity that existed across a single studio and course, this came at the cost of building rapport with students. In response I spent the second semester almost entirely with Isobel Law's tutorial group, having found her to be particularly supportive of my research. In the case of American History, at the recommendation of the course organiser I joined a tutorial group led by Evelyn Hopkins who, I was advised, would not be unsettled by my presence in class. As the semester unfolded I developed a good relationship with Evelyn Hopkins and, at her invitation, joined her tutorial class for the second semester. Moving onto staff participants, in the case of Architectural Design I spent time with the full group of ten tutors as I observed weekly team meetings, end-of-semester marking days and other events. This was narrowed down to five individuals at the point of interview as I will come on to discuss. In the case of American History I observed and interviewed all four tutors, as well as Evelyn Hopkins in her role as a tutor group leader. Therefore in respect of staff, the recruitment of participants was largely governed by course structure.

Towards the end of the second semester, five students from each course agreed to participate in the digital sociomaterial journaling exercise described above, four of whom also agreed to let me shadow them for a day each. In gratitude for agreeing to be involved I gave each student a £20 gift voucher drawn from my *ESRC Research and*

Training Support Grant. In order to avoid giving the impression that participants were being paid to produce a particular type of outcome, I decided they would be paid irrespective of whether and how they contributed. In selecting participants for these exercises I did not limit the group to the more outwardly confident or talkative students as I was keen to hear the voices of students who situated themselves on the periphery of the class or my research. The same students participated in interviews during the final stage of my fieldwork. In the case of academic staff I interviewed the ten tutors with whom I had spent most time across the two semesters.

Ethical approval and consent

The ethics application that preceded my fieldwork was completed within the guidelines of my university and the *British Education Research Association*. This included the use of written consent forms (see Appendix 8) tailored towards staff and students from the tutorial groups where most of my research took place. These forms explained the purpose of my research, the data I intended to generate, and how I would use and store this material. I also emphasised that participants could withdraw consent for me to use this data at any time. A different approach was required for the wider cohort of 300 American History and 140 Architectural Design students who were present in the lecture classes I attended, but not of individual interest to my field work. At the beginning of each semester I negotiated with course organisers to address the entire class, introducing my research and inviting any students to contact or approach me if they had any concerns about my presence in class. Across my field work I reintroduced myself to students sitting nearby, for instance if I intended to take photographs. Beyond this, I always made a point of making my camera and audio recorder clearly visible when generating data. I did not receive any objections to my presence in class or the generation of data described here. More challenging were those occasions where my fieldwork took place in public settings beyond the classroom, with the inevitability of there being individuals present who I had not had the opportunity to explain my research to. My approach in these instances was to avoid generating data where individuals might be identifiable. As such, the staff and students who might be recognised through photographs and audio recordings reproduced across this thesis gave me consent to use their data in this way.

Trust, rapport and power dynamics

The ethical approach described above was a necessary pre-requisite to beginning my field work, but also a way of building trust with staff and students. This was an important consideration when the power relations between researcher and participants can have a considerable bearing on the work that takes place within the field and during interview (discussed for instance by Vähäsantanen & Saarinen 2012 and Cohen et al. 2011). The position I took when working with students was to avoid projecting a sense of hierarchy in order that they would feel comfortable in my presence and willing to talk openly. From the earliest moments of my field work where I introduced myself to the class and circulated consent forms, I referred to myself as a PhD student when I might alternatively have used the grander title of 'Doctoral Researcher'. I also made it clear from the outset that I had no influence over marking, feedback or any other aspect of the course. In the case of Architectural Design where I attended tutor meetings directly before classes began each Friday morning, I made a point of delaying my entrance to the studio in order to visually and physically separate myself from the staff team as they entered the teaching space. I felt these to be important considerations when effective ethnographic work is seen to depend heavily on the researcher establishing trust and rapport with participants (Cohen et al. 2011) or what Hammersley & Atkinson refer to as managing 'field relations' (2007: 63).

Trust developed more organically as I made myself useful in and around the classroom: sweeping the Architecture School gallery ahead of an exhibition of work; fetching coffee when students or staff were tied to the desk. I shared photographs from my field work with Robbie Stanton for inclusion in his reflective portfolio and helped Matthew Redfearn to create a music playlist as an accompaniment piece to his design project. When I had cake left over from a birthday party I brought it to the American History class as Evelyn Hopkins and several of her tutees had done before. I also manufactured opportunities for informal 'corridor conversation' by arriving early ahead of History classes. When walking through the city centre I began to redirect my route so that I could drop into the design studio outside of class time.

As I became established in the tutorial room and design studio, tutors invited me to share my thoughts on Nathan Coley's *Lamp of Sacrifice* and Woodward and Bernstein's role in Watergate. I went for coffee and lunch with Olivia Yates, Victor Marsh and Richard Gates where they gave me the inside track on Architecture education in a way that was not apparent from observing studio practice or reading through the course outline. From there I took up the invitation to present my preliminary findings to the course team at the end of the first semester. There is no way of accurately establishing the degree to which my presence as a researcher altered the actions of staff and students, or the insights they shared with me. Nevertheless, my feeling is that the approaches described above reduced the level of 'performance' (Gold 1997) or 'reactivity' Cohen et al. (2011), where participants feel inclined to act in a different way in the presence of a researcher.

Knowing when to 'pause' the gathering of data

Crucial to gaining the trust of research participants was having a sense of when to switch off my audio recorder, put aside my camera and step back from a scene unfolding in class. The need to selectively generate data was most obvious during the weekly meetings of Architectural Design tutors where conversation sometimes turned to individual student performance or welfare. My wider approach during these meetings was to make typed notes rather than audio recordings, however at appropriate times I would also make a point of closing my laptop when discussion looked set to broach sensitive issues. A similar approach was required during assessment days when tutors would discuss individual student work. On these occasions I took photographs and made generalised field notes. I also exercised discretion during one-to-one tutorial conversations on occasions where a student was learning that his or her approach was falling short of the expected standard: as a researcher I had a duty to observe what was taking place, but felt that placing my audio recorder in the middle of discussion would have been needlessly intrusive. At other times I chose to move to out of earshot, for instance when an American History student began to cry as she expressed anxiety around her essay assignment during the tutor's office hours. In these and similar examples my approach was governed by a sense of what was ethically correct, combined with the knowledge that gaining the trust of staff and students was considerably more important than generating an exact record of what was being said.

Opportunities and challenges

Having previously worked at Ancient City University I had the advantage of beginning my research with some familiarity of its administrative procedures and the range of academic programmes that might provide a suitable setting for my field work. From there I called on former colleagues to engineer an introduction to the individuals responsible for coordinating the Architectural Design and American History courses. The same colleagues were also able to point me in the direction of senior departmental staff who would rubber stamp my research plans. A weakness of educational ethnography, according to Walford (2008), is the tendency for researchers to take a convenience-first approach in selecting a field site, therefore I want to clarify that I selected Ancient City University on account of the breadth of courses it offered. Meanwhile the Architectural Design and American History courses offered suitably contrasting approaches to teaching and assessment (the initial interest of my research). From there it was simply a case of pragmatically taking advantage of pre-existing relationships and opportunities that arose.

The greatest challenge I encountered during my research concerned the shift in direction from multimodality and assessment, to sociomateriality and learning spaces. This meant undertaking a further semester of fieldwork and immersing myself in a new set of literatures. It also meant putting aside some early writing and other work. On occasion, the preparation of this thesis has neatly enacted what Law argues to be the messy reality of research (2004), even if this offered little consolation at the time. The opportunity to extend my fieldwork was an opportunity that would not have been open to every researcher, even if the wealth of generated data ultimately felt overwhelming as I wrestled with how I might bring this material into a coherent piece of work. Being aware that it is the ethnographer's job to make sense of a large body of data and experiences (Walford 2008) did not ease my anxiety around this task. I added further complexity by deciding to use digital artefacts to support the exposition within this thesis, as well as foregrounding the use of sound. Elsewhere, practical challenges included some disruption and delay as I spent a month fulfilling my civic duty as a juror in the High Court, and the task of balancing childcare with the need to get my ideas onto the page and screen.

The hidden authors behind this research

Earlier in this chapter I described how the method assemblage of Law (2004) and Fox & Alldred (2015) calls on the researcher to consider his or her own status in relation to a wider range of non-human resources and interests. I have also drawn attention to Thompson & Adams' (2013) argument that digital technologies should be recognised as co-researchers. I want to draw this chapter to a close, then, by extending my discussion of reflexivity to consider how sociomateriality raises questions about the authorship that exists around my own work.

Already in this thesis I have referred to *my* research and the original contribution that *I* am making. If I want to maintain a sociomaterial sensibility there is a need to acknowledge that this is not only *my* work. An unconventional addition to the declaration of authorship towards the front of this thesis is a list of technologies that contributed towards my research. Although this evokes the technical information that sometimes accompanies the liner notes to a music album, in fact it was a way of acknowledging how camera, computer, and code were co-authors of my research. Or to put it more simply, this thesis owes a considerable debt to non-human devices, software and algorithmic calculation, as well as the unseen individuals in far corners of the world whose physical and cognitive labour enabled me to convert the sounds of the design studio into data, and to document the American History lecture in 12.1 Megapixels of colour and detail. Further down the same page can be found a note of my different learning spaces. This time the similarity is with film credits that list the studios and settings where a feature was recorded. This thesis was produced on location in the cafe, library, living room and elsewhere. When the materialities of a physical space are implicated in the performance of educational activity, as I will come on to argue, it felt important that I should turn attention to some of the settings that contributed towards this thesis. Meanwhile, when I will spend most of Chapter 6 arguing that music helped to shape the learning spaces of students, I have also briefly noted this to be case in my own research. Accounting for the full range of people and material resources implicated in the work presented here could subsume a considerable part of this thesis, therefore I will stop at this stage having made the point that the arguments presented from the beginning of the next chapter are my work, but in co-authorship with a lengthy list of human and non-human actors.

Chapter 4. Thinking Space

Introduction

In this chapter we will take a critical journey through a wide range of spaces associated with the American History and Architectural Design courses. The title used here - 'Thinking Space' - acknowledges the multitude of settings across and beyond the campus that supported reading and reflection, drawing and writing, model making, note taking and other educational activities. Across the next pages we will spend time in the lecture theatre and design studio that were the dominant teaching spaces of each course. We will drop into the library and print room, before venturing beyond the university perimeter to visit some of the nominally social, domestic and transitory settings where learning took place. Our purpose will be to explore how digital technologies helped to shape those spaces where students assembled or individually participated in educational activity. In the pages that follow I want to advance two of the central propositions of this thesis. The presence and positioning of digital technology within a learning space, I will argue, nurtures particular epistemologies and power dynamics. Tied in with this, I am going to make the case that the conceptual boundaries of the classroom and campus are reconfigured by digital technologies and the flow of data. In putting forward these ideas I am going to draw on a series of vignettes and examples from my field work, as follows.

First, we will see that the presence in the classroom of image and sound-based technologies helped tutors to exert influence over their surrounding educational spaces and practices. This has a particular significance for university staff concerned with course design and delivery, and their colleagues who are involved in making decisions around the procurement of classroom technology. A different set of power dynamics were performed beyond the campus where the portability of academic material and the proliferation of mobile technologies enabled students to establish and arrange learning spaces where they did not previously exist. As we spend time in the café and student flat, it will become evident that digital technologies and pedagogies had rendered students less bound to the University's physical estate than was once the case. We will see that the campus retains considerable symbolic, practical and pedagogic value, however the

classroom is itself transformed by the passage of data and presence of digital devices. The design studio and lecture were first and foremost places of learning, however at the swipe of a screen students were able to broaden the spatial identity of these settings as they followed digitally-mediated pursuits of a domestic and social nature.

Technology and visuality in the American History classroom

We will commence our critical excursion in those settings where scheduled teaching took place, beginning with the American History course. I am interested here in those spaces where students and tutors would gather to participate in a broad range of teaching and learning. Although referring to these settings as 'classrooms' and 'teaching spaces' fails to adequately account for the range of activity they accommodated, it is a pragmatic way of denoting environments that were assigned a specific instructional purpose, even if that was sometimes only fleetingly the case. At different times in the literature these types of setting are referred to as 'formal' learning spaces (see for instance Brooks 2011; Dugdale 2009) in order to distinguish them from the assumed informality of the café, library and other places where educational activity is performed. While there is a need to recognise that different parts of the campus carry their own distinct qualities, in common with Boys (2011) and Jamieson (2003), I have not found it helpful to categorise spaces as either formal or informal, particularly when the designated teaching areas of the Architecture School were mostly unceremonious and casual. Furthermore, as I will argue below, the flow of data enabled a single setting to simultaneously support a range of formal and informal activity, irrespective of whether it was assigned the function of teaching or relaxation.

The American History course was mostly taught in two almost identical lecture auditoriums that were full to their capacity of 300 during the early stages of each semester. From Plymouth Rock to President Trump, the story of the United States unfolded in this setting across three lectures each week. Students also assembled in groups of around ten for weekly tutorials that took place in much smaller classrooms dotted around the History Department. A further opportunity to ask individualised questions came during tutor office hours. In the case of Evelyn Hopkins, these were hosted in the History department café: as a junior member of staff she did not have her own office. These spaces, alongside the

teaching they supported, are documented in the video below, which combines audio recordings, photographs and notes drawn from my field work.

Within the setting of the lecture theatre, technology was perhaps most immediately apparent in the bursts of typing and banks of glowing laptop screens that can be heard and seen in the video. As students recorded the significant events in American History, their gaze shifted between the lecturer and a PowerPoint presentation that was projected across two vast screens. The prominence of visual content within teaching material had been a recurring theme in my early field notes. Lecture slides displayed a sequence of maps, illustrations and portraits depicting the key events and protagonists of early American History. As the course progressed across four centuries, photographs and then video clips become a prominent feature of presentations, mirroring the modernity and technological progress of the corresponding ages. Visual material was also an important part of tutorial classes where Evelyn Hopkins regularly prompted discussion to the backdrop of photographs: the Gettysburg Address, Martin Luther King; Making America Great Again. Students were also given the task of sourcing and then presenting images that explored an aspect of the American Civil War and the later conflict in Vietnam.


American History teaching spaces

During interview, Neil Jardine (American History tutor) explained that image-rich presentations were able to give a sense of what the past looked like, while his colleague Andrew Marks noted that PowerPoint technology was particularly helpful in conveying the geography that was vital to teaching American History. From the student perspective, Lizzie Green remarked that visual content helped to ground the particular subject and its personalities. For Debbie Harris and John Brown meanwhile, image-rich slides made it considerably easier to remain engaged and alert, particularly compared with classes where content was mostly presented through the printed or spoken word. This was not a view that was entirely shared by their tutor, Charles Hart, however:

> I'm under no illusions with lectures. People always zone in and out. I have the same sometimes when I go and see a paper and it's an hour long, and its hard. But of course, PowerPoint is another one of the means that make this increasingly easy. You know, because you can always say, 'Ah, if I don't really listen for the next five minutes I guess I can look at the slide. And if I don't look at it now I can look at it later'. (Charles Hart, American History tutor)

We will spend more time considering the potentially disruptive influence of technology within the classroom in Chapter 5, however it is interesting at this point to note Charles Hart's suggestion that PowerPoint might simultaneously dilute and displace the intended educational experience of the lecture theatre. For the moment, though, I want to spend some time considering how presentation software and data projectors were seen to have gradually engendered a more image-oriented classroom environment. During interview, all of the American History tutors took the position that the combined simplicity and sophistication of presentation software had helped to bring a more visual emphasis to their teaching environment than had previously been the case. If the historical roots of the lecture method invite us to think about a predominantly language-based medium for communicating academic knowledge, the heightened visuality described here highlights the existence of more image-privileging and multimodally-rich teaching practices and spaces. The impact of digital visual technologies reiterates a shift away from what Jewitt et al. describe as the traditional 'opposition of 'verbal' and 'non-verbal' communication', (2016:3), as Andrew Marks instead told the story of American History through a juxtaposition of image, spoken language, movement, gesture and other meaning-carrying resources.

It is important to acknowledge, however, that the gradual development of a more visually-oriented lecture environment was not purely attributable to technology, but also influenced by the willingness of Charles Hart and his colleagues to spend considerable time preparing presentation materials, as they explained during interview conversation. Going further it was also shaped by subject matter that particularly lent itself to the image, while also being practically dependent on the physical fabric and spatial materialities of the lecture theatre, including the presence of large projection screens and raked seating. Therefore where tutors might immediately appear to have the ability to shape a particular

type of learning space, from a sociomaterial perspective this power was enacted in conjunction with technological, physical and other agents.

To offer further nuance around the relationship between technology and the lecturer's negotiation of his teaching environment, I want to draw this vignette to a close by suggesting that digital resources could conversely work in opposition to the visually-oriented exercising of power over space described here. In the next Chapter we will spend time discussing the roll-out of lecture recording technology at Ancient City University that began to take place during my field work. When I raised this topic during interview, staff from American History and Architectural Design expressed the concern that the distribution of their teaching material via video streaming technologies raised questions about image copyright. In the case of American History, tutors anticipated that their teaching materials would carry fewer examples of visual content in the future as a result. Therefore where PowerPoint and the data projector had helped these tutors to engender more visually-oriented teaching spaces, the latest digital-visual technologies to appear in the classroom might have the effect of lessening, or at least problematising, the power to continue doing so. This is a theme I will return to in Chapter 7, however for the moment it is sufficient to say that digital technologies have been shown to be woven into articulations of power in the classroom, even if this evolved in line with the changing subjectivities that exist in the performance of learning space.

Sound, knowledge and power in the American History classroom

Shifting attention from image to sound, I want to now consider what the digital reproduction of the lecturer's voice can tell us about the way that technology was implicated in the nature of pedagogy, knowledge and power in the American History classroom. The discussion that follows was informed by dialogue with Aidan Braithwaite who, in the role of Learning Spaces Technology Manager, had overall responsibility for equipping Ancient City University's teaching spaces with audio-visual resources. Through conversation, photographs and technical drawings, Aidan was able to explain the purpose and positioning of different types of microphones and audio speakers in the lecture theatres used by the American History course. These devices, and the sounds they helped to produce, are documented in the interactive sound map below.

Although the map can be accessed via a smartphone, on this occasion it is best viewed via the larger screen of a tablet or laptop (by clicking on the image or by visiting https://tinyurl.com/y5xptohl).

Lecture theatre sound map

The arrangement of 12 ceiling speakers, Aidan explained, was designed to project the lecturer's voice as consistently as possible across the auditorium. Academic staff were also expected to use a Lavelier (lapel mic), while hand-held microphones were available for Q&A sessions and the rare occasions where spoken audience participation was invited. When most universities adopted what he referred to as a rudimentary 'plug-in-and-play' approach, Aidan explained that he was able to work with colleagues on a series of detailed acoustic designs. The completed plans were then passed to a specialist contractor who installed the amps, loops, microphones, speakers and other technologies that collectively threw Charles Hart's voice to all corners of the lecture theatre. It is interesting to juxtapose the considered reproduction of the tutor's spoken words (and accompanying choice of audiovisual content) against the sparsity of student voices that can be heard within my field recordings from the same venue (at least once class had commenced). From a technical perspective, the arrangement of sound technologies efficiently dispersed the tutor's voice throughout the lecture theatre; from a pedagogical and epistemological perspective, as I explain below, the audio system reinforced hierarchical power relations and a particular conceptualisation of knowledge within American History.

The purpose of the American History course, as made available to students via their university portal, was to provide a general overview of American history from the arrival of early European settlers to the present day. The lecture was vital to achieving this, as it provided a way of efficiently communicating a body of information to students (explained during interview by Neil Jardine) while telling the story of American History in a way that was not conveyed through textbooks, as tutors 'joined the dots between different readings' (Andrew Marks). Students were then expected to bring their own interpretive skills to this knowledge: through tutorial discussion, by independently consulting primary

and secondary sources, and the preparation of essays. The dual nature of knowledge was articulated in the following way by Charles Hart during interview conversation:

> Knowledge is first and foremost about, you know, the facts of history. But for students of history, really, this is only the skeleton of what they need to know. They need to know the facts. They need to know about the background to the topics that they talk about. But then they also need to know about interpretation.
> (Charles Hart, American History tutor)

The need to provide students with 'the facts of history' and 'the background to the topics' was consistent with the considerable amount of class time that was spent conveying a body of academic content from tutor to student audience. This was supported by a comprehensive list of readings and other content, accessed via the course learning management system that, according to Charles Hart, provided students with almost everything they needed to complete course. Of course, the ability to interpret and work with academic content was vital, however there is a clear sense of knowledge being hierarchically passed down from tutor and text to learner, assisted by the technologies of data projector, audio system and learning management system. The following excerpt from my field notes reflects the shifting patterns of sound that could be heard in the lecture theatre, but also the way that the digital amplification of the lecturer's voice helped to command authority at the beginning of class:

> Barely an empty seat. The volume of conversation drops as Charles Hart steps towards the lectern. Feedback on the microphone. The clicking of computer keys sounds like rain hitting a tin roof. Latecomers trying to find a seat, rubber-soled shoes sticking on the vinyl floor.
> *(Field note from an American History lecture, semester 2)*

A precedent for this relationship between sound, space and power is found in the work of Rath (2012), albeit in places of worship rather than places of learning. In the same way that Aidan Braithwaite and his colleagues designed an audio system that aimed to elevate the lecturer's voice above all other sounds in the auditorium, Rath describes how the sonic architecture of the church and cathedral was tied to ontological belief and the positioning of clergy in relation to the congregation. Without suggesting that Neil Jardine was a conduit of Historical doctrine from on high, a parallel can be found in the digital-acoustic

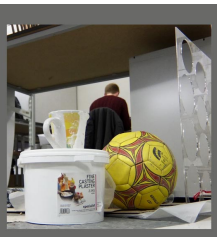
amplification of his voice and what Rath describes as the design of reformation churches in a way that supported the clarity and authority of the minister's voice as he hierarchically conveyed the Sacred Word to his parishioners. The architecture studio meanwhile, with its conversational ambience and absence of sound-reproducing technologies (discussed below) more closely resembled Rath's description of the Quaker church, where ceiling panels were erected in pursuit of an egalitarian parity in the projection of voice. In the church as in the classroom, the acoustic treatment of voice talks to us about power relations and the nature of knowledge. Therefore where sound has been associated with manifestations of power (Gallagher 2016), authority (Feld 2003) and the nature of knowledge (Gershon 2011), I want to suggest that sonic technologies helped to engender and enact a particular classroom and course-specific hierarchy within American History.

With its emphasis on human agency and interest, the concept of power relations is somewhat problematic, though, from a sociomaterial perspective. After all, power never exists as a discrete contract between teacher and student but instead flows between and through a much wider body of human and material actors (Fenwick & Landri 2012; Postma 2012). This does not deny that the lecturer held considerable authority and influence over the class: this was apparent in the hush that fell across the auditorium as Timothy Stone or any of his colleagues stepped towards the lectern. My point, though, is that we need to see this apparent exercising of power as contingent on a wide range of resources, including but also extending beyond the lecturer's spoken interests. In a different kind of auditorium, Prior argues that the music performer's voice emerges through an entanglement of 'non-human circuits and exchanges' (2017:1), rather than being solely attributable to the corporeal individual, for instance. Taking the example of the fictional pop-construct Hatsune Miku, and drawing on Actor Network Theory (Law 1992) and Deleuze & Guattari's concept of agencement (1988), Prior proposes the 'vocal assemblage' as a way of accounting for the multitude of technological, human, commercial and physiological resources that coalesce in the creation of this particular music. Although the concert arena and catchy anthropomorph pop of Hatsune Miku do not immediately resemble the lecture theatre where Charles Hart performed in front of his own enthusiastic audience, a parallel exists in the projection of voice through an orchestration of the social and material. This reiterates the complexity that exists around

the production and consumption of sound as discussed by Flügge (2011) and Augoyard & Torgue (2005) among others (see Chapter 2). Returning to my conversations with Aidan Braithwaite, the audio system within the lecture theatre was designed to efficiently disperse the lecturer's voice, however the projection of sound was also affected by, among other things, the fabric properties of raked lines of seating and the decision not to upgrade the plaster board wall-cladding when last renovating that teaching space. The projection of the lecturer's voice was also subject, Aidan explained, to the fluctuating presence of students who were themselves 'acoustic objects', when the bodily curvature of the human form absorbs and alters the trajectory of sound.

Clutter, chatter and creativity: the Architectural Design studio

A considerable advantage of simultaneously undertaking fieldwork in two courses came through the opportunity to immediately identify the differences and similarities between learning spaces. Moving swiftly from History Department to Architecture School, the comparable absence of hierarchy in the design studio was plain to hear and see. Where American History students sat in almost-silence, dutifully taking notes, the design studio was characterised by conversation and collaboration. Although American History students participated in tutorial dialogue, this rarely deviated from the direction and structure set out by Evelyn Hopkins as they responded to direct questions or presented work prepared outside of class. As with the lecture theatre, there was a symmetry between the tidy order and structure of the classroom, and the learning that took place. In contrast, my field notes from the design studio record my impressions of 'clutter', 'chatter' and 'creative chaos'. The contrasting ambience, pedagogy and spatial arrangement of the two courses is particularly evident when comparing the earlier video of American History spaces, with these sonic and visual impressions from the design studio.



The Architectural Design studio

The sights, sounds and field notes presented here were generated early in the first semester as I walked the length of the design studio, trying to get a sense of how teaching varied across the 10 tutorial bays, each with its own member of staff. As I later redirected

my research focus towards learning *spaces* rather than learning *practices*, I became more interested in what I might learn from the fluctuating soundtrack and contrasting layout of adjoining areas. The interview conversation prompted by these and other images (see Chapter 3) suggested that the character of each bay emerged through a negotiation of human and material interests, opportunities and limitations. This included the individual tutor's preference for how work should be presented, for instance in the way that Graham Locke required his students to frame and hang examples of their plans across a partitioning wall of the design studio. For Olivia Yates meanwhile, who began each tutorial with a group exercise, the day often started with students pulling their desks into a single area. On these occasions the negotiation of space was shaped by Olivia's feelings around pedagogy (which she explained were influenced by her own architectural apprenticeship), the cooperation she had been able to establish with her tutees, the physical dimensions of the design bay, and historical administrative decisions to invest in movable furniture. The freedom to rearrange this space was also enjoyed by students, for instance as Sandy McFall, Edward Simpson and their neighbours opted for a more social and collaborative atmosphere by rearranging their desks so that they could face each other when working. The character of the tutorial bay was partly dictated through its floor space and partition boards, however as the video above demonstrates, students responded to these fixed materialities by personalising their work spaces. The following excerpt from my field notes reflects the range of different academic and non-academic activities simultaneously taking place in one corner of the design studio, pointing towards the ability of students to exercise a level of control over their educational space and practices that was not apparent in the setting in the American History course:

> Edward is eating a toasted sandwich. Karen is sketching. Matthew is using the torch on his phone to examine a model. Robbie arrives, sits at his desk. Puts on his headphones, opens his laptop, starts working.
> *(Field note from the architectural design studio, second semester)*

Compared with the power relations apparent in the American History lecture theatre, the ranging conversation and absence of comparable technologies in the design studio was less suggestive of hierarchy. Where (American History tutor) Timothy Stone stood behind a lectern, his voice amplified by the careful arrangement of ceiling speakers, Victor Marsh

(Architecture Tutor) preferred to sit among his design group, offering suggestions and sketching feedback directly onto their drawings. And where Charles Hart would illustrate an idea by gesturing in the direction of a projected map, Isobel Law's close proximity to her tutees meant she could lean forward and bring up an image on her smartphone. The learning spaces and practices of American History, I have argued, supported the communication of a body of knowledge from student to tutor: within Architectural Design, collaboration came to the fore as students worked closely with staff and each other, reflected in the constant hum of conversation across my field recordings. This should be not read, however, as an absolute absence of hierarchy between students and staff, particularly when the individual tutor's pedagogic position helped to shape the layout and ambience of each design bay. Staff also exercised considerable influence through the individualised feedback they provided each Friday, alongside the recommendations they offered during mid-project review exercises.

Eating, working, sleeping: at home in the design studio

Although Sandy McFall and Matthew Redfearn were not entirely enamoured of their surroundings in the design studio, a considerable compensation for the low ceiling and lack of natural light came through their perceived ownership of that space. When American History students described 'attending' classes on campus, Sandy McFall and Yvonne Fisher explained that, for many of their group, the design studio doubled-up as a workspace and a 'second home'. The homely ambience of the studio is clear in the sounds and photographs within this sound map (also available at: https://tinyurl.com/y3lhvaat).

Design studio sound map

The domestic character of the design studio is most evident in the plastic containers and paper cups that give a flavour of local supermarket *meal deals* and advertise the range of coffee shops within walking distance of the Architecture School. It was a different story for American History students, who were welcomed to the lecture by signs prohibiting them from consuming food or drink beyond its doors. With its raked seating and the sonic and visual projection of his voice and ideas, the lecture theatre was largely presented as being

as tutor's domain. In contrast, Architecture tutors such as Isobel Law felt it appropriate for students to exercise a high degree of influence and over the design studio:

> Do you know, it's their work space. I think that, you know, it should be however they feel comfortable working in. As I said, sometimes, especially up at that corner of the studio, some weeks I couldn't even find space to put my chair, you know. At points I have to just say, "Right guys, this is becoming a bit of a fire hazard. We need to just invest a bit of time in tidying up after yourself'. But you know, I just kind of see them as creative places and I'm not one to judge what somebody else's workstation should look like. And as I see lots of coffee cups it just makes me think, 'Well actually they're working really hard, they're needing caffeine!' (Isobel Law, Architectural Design tutor)

Isobel's colleague, Graham Locke, referred enthusiastically to the 'liberty' that students enjoyed to occupy and shape a space in a way that was surely not enjoyed by undergraduates anywhere else in the University. The language and sentiments offered by Isobel and Graham are suggestive of the institution ceding an amount of spatial power to Architectural Design students. This does not mean, of course, that students enacted absolute control over the design studio (and neither would this would be possible from a sociomaterial perspective when any setting is contingent on a wide range of agents). By setting expectations around the arrangement of desks for tutorial discussion (Olivia Yates), the presentation of work in a series of picture frames (Victor Marsh, Graham Locke) and more practically the occasional need to clear the floor of debris (Isobel Law), tutors continued to exercise influence over the space that Sandy McFall and Yvonne Fisher called 'home'. And this was not limited to the occasions when tutors were present in the studio each Friday, highlighted through an approach that Olivia Yates explained to me during interview conversation. In order to confront what Olivia saw as a range of challenges associated with the structure of the Architectural Design course, and some of the uncertainties that it bred among students, she turned to Facebook to support and shape what took place in the design studio:

> That's the first thing we do, is all sign up to the Facebook group. I ask them all to post something every week. And that partly has the same function for students to spur each other on. And be feeling like they're jointly productive. But also to be OK about putting their work out there. (Olivia Yates, Architectural Design tutor)

For Olivia Yates, compulsory involvement within the Facebook group was an attempt to nurture a student culture that she felt was vital to working in architecture. In Olivia's the view, the presence of partitioning screens, combined with the overall size of the course, limited opportunities for students to be inspired and prompted into action by the ideas and work ethic of their wider peer group. Extending dialogue into the networked space of Facebook also served a more practical function when Olivia only had the opportunity to be (physically) present with her the tutees during studio time on each Friday:

> I just don't think once a week is really enough. If the student hasn't really done anything for a week that's a whole massive amount of time that's just disappeared and been wasted. Which is why I like to put a bit of pressure on them to top it up during the week, rather than rushedly doing something on Thursday night.
> (Olivia Yates, Architectural Design tutor)

The creation of the online community space thereby created a hybrid of networked and physical environments that combined the studio, Facebook platform and Olivia's architectural office. Although Olivia was physically separate from the group from one Friday to the next, she was able to cajole and support her tutees as they progressed their model-making and drawing in the studio. The significance of this vignette is in reiterating that, while students and tutors were united in recognising and celebrating the power and ownership that Sandy McFall and peers exercised over their surroundings, this was performed in conjunction with the interests of staff, while also being contingent on the physical qualities of their surroundings and other social and material resources besides. Most interesting from a digital perspective however, was that Olivia Yates was able to exercise influence over the studio without having to step through the doors of the Architecture School.

Students enjoyed a different kind of influence over the campus during an exhibition of their work that took place during the fifth week of the first semester. As Richard Gates explained to me during interview, the pop-up exhibition of 2000 models was instigated to encourage students to celebrate and see the value in the work, while also pausing for reflection. Across an afternoon and evening I watched and listened as students initially discussed the layout of the gallery with Richard, before all 140 members of the class

visited to arrange the architectural models they had produced during the first block of the course. As can be heard and seen in the final sequence within this video, a drinks reception was later set up at the gallery entrance, enabling staff and students from the Architecture School to enjoy a glass of wine as they surveyed the work on show. Students enjoyed considerable influence in shaping the character of the gallery on this occasion although, as the video attests, this was exercised in conjunction with the possibilities and limitations of studio lighting, floorspace, the availability of long rolls of paper and advice from staff and their peers. Nevertheless, there was a clear opportunity to influence their surroundings that was not available to their counterparts in American History. Assuming they arrived early enough for American History lectures, Heidi Green and Neville Smith would choose a location in the auditorium towards the front and alongside friends. Once seated, their movement and posture, and the direction of their gaze, was heavily influenced by the rigid fittings and layout of the auditorium. In contrast, Architecture students could rearrange their immediate studio surroundings, but also enjoyed the opportunity to walk around and beyond the Architecture School as they participated in learning activities.


Pop-up exhibition of 2000 models

Early in the first semester I joined Isobel Law (Architecture tutor) in an art gallery where she toured the exhibition with her students, encouraging them to think about different ways of exploring and presenting their design thinking. A fortnight later we assembled in the city centre location that was the assigned site for the architecture school that students had been challenged to design. As the video here shows, tutor-prompted conversation, sketching and note-taking clearly identify this as a teaching space, even if the urban setting does not immediately cohere with how we visualise a university classroom. On this occasion, I felt that audio recordings and photographs were sufficiently explanatory not to need the inclusion of field notes.


Architectural Design site visit

On the same day that Isobel Law's group were reckoning with the quality of light and flow of traffic in one corner of the city, Olivia Yates was leading her yellow-vested students on a tour of a construction site. At other times Olivia and other tutors took advantage of the Architecture School's central location to direct students towards museums, libraries and other urban settings that might inform their work. Much further afield, students and staff spent an extended weekend during the second semester in Rome, searching for lasting architectural enlightenment. If the discussion here seems to be a deviation from the digital interest of this thesis, in fact these examples helpfully discourage us from assuming that learning spaces beyond the campus are dependent on technology. As discussed in Chapter 2, an important part of the contemporary discourse around educational spaces concerns the way that digital resources increasingly enable teaching and learning to take place in settings beyond the university's estate. The gallery outing, site visit and field trip, all essential components of the Architectural Design course, were undertaken with limited emphasis on technology, albeit the smartphone proved to be a convenient way of photographing Damián Ortega's sculptures and recording the vibrant sounds of the Piazza Borghese on market day.

Beyond the classroom and campus

I want to now journey beyond the teaching spaces of American History and Architectural Design to consider some of the wider settings where learning took place. In the vignettes and examples that follow, I am going to suggest that digital technologies and power were again woven together in the negotiation of learning space, although in different ways and settings compared to what we have just heard and seen above. The discussion that follows is considered alongside work in mobile learning, a research field that has mostly been overlooked in the critical discussion of contemporary university spaces. Although mobile learning supports a range of interpretations and terminology (discussed for instance by Frohberg 2009) it is broadly understood to be concerned with the ways that portable digital technologies enable educational activity to take place beyond the conventional teaching spaces of the classroom and campus. This includes the way that hand-held devices such as the smartphone and tablet engender the creation of 'impromptu sites of learning' (Sharples et al. 2007: 65), but also support more persistent and structured periods of activity, as reflected in Crompton & Burke's recent review of the literature

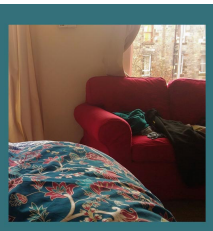
(2018). The important point, however, is that the portability of digital devices, combined with Internet connectivity and the flow of data, enables the student to participate in educational activity across a range of contexts (Jones et al. 2013).

As will become apparent, this concern with the relationship between place, technology and educational activity helpfully frames my interest in the ways that students negotiated personalised learning spaces during my fieldwork. Where the critical interest in learning spaces has understandably tended towards the university's built campus (Yeoman & Ashmore 2018; Smith 2017; Carnell 2017) and to a lesser extent how we might recognise the convergence of the physical classroom with online environments (Ravelli 2018; Johnson & Khoo 2018; Nordquist & Laing 2015), mobile learning opens a thematic door to more impromptu and transitory settings where a student remotely enters the university's environs via the touch ID on her smartphone screen. We get a sense of the dispersed nature of learning in the following table, which brings together the full range of settings where students from each course participated in educational activity:

	On campus	**Beyond the campus**
American History	lecture theatres, libraries, computer lab, tutorial rooms, departmental cafés, student union, corridors and concourse areas adjoining classrooms	student flat, family home, train carriage, aeroplane cabin, cafés, jazz bar
Architectural Design	lecture theatres, libraries, computer lab, design studio, architecture workshop, exhibition gallery, theatre, print room, 3D printing workshop, art shop on campus	student flat, family home, train carriage, cruise ship cabin, museum, public library, art gallery, construction site, city centre site, walking across the city, field trip to Rome

Learning spaces across and beyond the campus

A richer representation of the places beyond the campus where students participated in educational activity is provided in the following video which draws entirely from field recordings, photographs and textual descriptions that students submitted to the digital sociomaterial journaling exercise (introduced in Chapter 3). The 'postcards' I received from this exercise provided me with a valuable glimpse into personal and impromptu learning sites (Sharples et al. 2007) that were not apparent during my fieldwork in the environs of the Architecture School and History department. As I will come on to discuss, digital technologies were an integral feature of most of these spaces. Although the café and train carriage that can be heard and seen in the video can exist as learning spaces without the call for technology, I am going to argue that digital resources contributed towards their being shaped in distinct ways. Travelling back to Ancient City University after a short visit to see family, Debbie Harris decided to productively pass the journey by listening to an American History podcast recorded by members of the course team. At around the same time, Ella Ness was in a city centre bar, scanning course readings on her smartphone as she killed time waiting for a friend to join her for a night out. Although content equivalent to that within the podcast and pdf might have been available in paper-form, it is significant that Debbie Harris and Ella Ness used mobile technologies to access this material in impromptu ways that would have been considerably less plausible with printed texts.

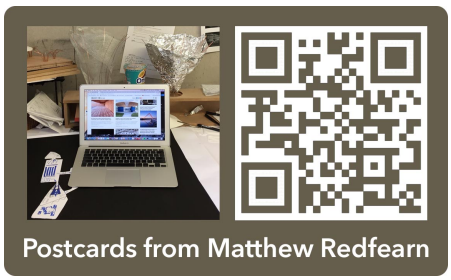


Learning spaces beyond the campus

In the case of Architectural Design, the impact of digital technology was less about being able to undertake learning in impromptu settings, but rather that the combined sophistication and mobility of software and laptop enabled students to perform design-related activities in places where it would previously have been impractical to do so. Although Richard Gates and his fellow Architecture tutors were clear that a hands-on approach to drawing and model-making remained vital within architecture education, the emergence of sophisticated design software like InDesign and AutoCAD, alongside graphics packages including Illustrator and Photoshop, had rendered students less bound to the desk and studio than was once the case. This is a different kind of liberty to that which Graham Locke used to describe the power that students had to shape their own

part of the design studio. Students had a strong attachment to the physical spaces of the Architecture School (discussed below) but also enjoyed the freedom to undertake aspects their work in other settings based upon convenience (Robbie Stanton), comfort (Sandy McFall) and whether an environment was conducive to productivity (Edward Simpson).

This tendency to make use of spaces across and beyond the campus is neatly captured in the audio recordings, photographs and textual descriptions that Matthew Redfearn generated within the digital journaling exercise.

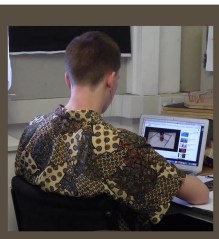

Postcards from Matthew Redfearn

Part-way through the video we see a laptop sitting open on a wide table. During interview Matthew explained that, while attending a family gathering at his grandfather's house, he had spent time in the dining room working on the 3D model of his community library. Considerably further afield, one of Matthew's classmates, Astrud Bextor, retired to her cabin during a family cruise holiday to navigate a way through a new graphics package. Where Debbie Harris and Ella Ness used the podcast and pdf to productively fill emergent windows of time, Matthew Redfearn and Astrud Bextor drew on technology to establish learning spaces in a pre-meditated and more persistent way. Furthermore, as Astrud and Matthew drew on the compositional possibilities of the screen to craft models and manipulate images, they were performing activities once confined to the desk and dark room. These negotiations of space cannot be singularly attributed to the mobility of the laptop and the sophistication of software, but are also dependent on the way that the pedagogy and practice of architecture has evolved alongside and through digital modelling, drawing and design. The ability to design on-screen, according to Isobel Law, represented a considerable departure from her own architectural apprenticeship where she worked surrounded by mountains of paper. Graham Locke was also clear that advances in design software had fundamentally changed architectural practice, which in turn demanded that students should develop new digitally-oriented design skills. This partial shift from drawing board to screen prompted new ways of working, but also a mobility that enabled students to establish learning spaces where they had not previously existed.

From a sociomaterial perspective, the liberty and power that students exercised in the negotiation of these personal learning spaces was contingent on the entanglement of digital technology (laptop and software), evolving industry practice (the move towards computer-aided design), pedagogy (the need to present digital design work within the project submission) and personal disposition (Matthew Redfearn and Astrud Bextor's willingness to sacrifice family time to pursue their studies). As discussed in Chapter 2, networked technologies are seen to have created ad hoc opportunities for learning, for instance as students use laptops to establish impromptu meetings and conversations (Lomas & Oblinger 2006) or check e-mail and other course information while sitting on a bus or in a park (Gourlay & Oliver 2016). These examples point towards a momentary and unrehearsed negotiation of learning space. Research in mobile learning, however, reminds us that transitory educational environments can be more than ephemeral as technology becomes central to educational practices beyond the classroom. The design activity that Robbie Stanton and Astrud Bextor undertook in the train carriage and cabin were transitory and digitally-mediated, but also pre-determined and persistent. Therefore where Lomas & Oblinger and Gourlay & Oliver correctly highlight how mobile devices and connectivity can help to establish impromptu and short-lived learning spaces-in-motion, students can use the same technologies to negotiate more sustained educational settings, at least until it is time to clear the table for dinner, or the cruise ship pulls into harbour.

Like Debbie Harris, Robbie Stanton found the train journey conducive to study, particularly on those occasions where the absence of wifi meant he was unable to fall under the spell of social media. It was a similar story for John Brown who found that being isolated from the Internet when flying back from a family gathering gave him a valuable period of uninterrupted background reading. We get a sense here of the multi-faceted relationship between digital technology and learning space: where the portability of the laptop helped Robbie Stanton and John Brown to establish environments that productively supported their portfolio work and essay preparation, in a different setting the connectivity of these same devices would dilute the educational quality of their surroundings. Nevertheless, these and the earlier examples reiterate how digital resources are implicated in

establishing educational environments in ostensibly transitory settings: trains, boats, planes and technology - the digitally-mediated negotiation of mobile learning space. A different kind of transitory learning space was apparent, though, when I shadowed Matthew Redfearn as he moved into the final stages of his library design project.



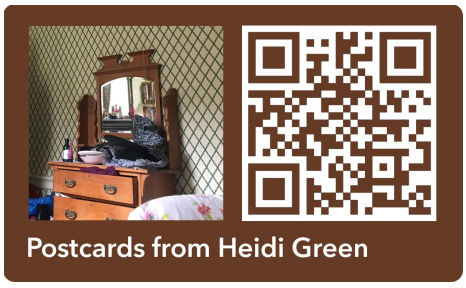
Shadowing Matthew Redfearn

Some of Matthew Redfearn's most productive thinking, he told me, took place as he walked between the different part of the campus, documented in the video. The mediaeval streets of Ancient City provided a route between the art college where Matthew could seek advice on 3-D printing, the university sport centre where he enjoyed a few lengths in the pool, and then back to the Architecture School. But these thoroughfares were also locations where, separated from the busy activity of the studio, he could make progress on some of the more conceptual challenges of his design project. By taking to the street in search of clear thought, Matthew Redfearn neatly enacted what Lee & Ingold describe as the potential for walking to open up valuable space for reflection (2006:73). The relationship between thinking and travelling by foot is also made by Pink (2009) and Ingold & Vergunst (2008), helpfully reminding us that educational activity 'spills across the boundaries of formally designated sites for learning' (Carvalho et al. 2016:1) and can happen in any setting where a student gives thought to an assignment or course theme. Where digital technology is often seen to support opportunities for transitory learning, on this occasion Matthew Redfearn consciously stepped away from the computer in order to establish a space that might help him to resolve some of the obstacles holding up progress on his community library.

A continued attachment to the campus

Although Matthew Redfearn established space for learning while traversing the city centre and seated at his grandfather's dining table, he was more often to be found working in the design studio. This was a routine he shared with the majority of his classmates, although not always for the same reasons. For Matthew, it was important to maintain separate spaces for socialising and studying, even if this was not borne out in the range of pursuits

he followed as he sat at his desk in the studio (discussed below). A considerable attraction of the studio for Edward Simpson was the sense of cooperation and general social ambience that suited his personality and preferred approach to learning. The camaraderie of the studio was also valued by Yvonne Fisher who chose the empathy of peers over the sarcastic remarks of flatmates who dismissed her degree for its emphasis on drawing, compared to the presumably greater critical demands of their own studies in science and engineering. That said, in a way that usefully reiterates the fluid and temporal nature of learning space, the design studio would become more sparsely populated towards the end of semester as attention shifted to preparing the reflective portfolio. Where previous generations of architecture students would have been more tightly bound to the Architecture School as they compiled cumbersome paper-based documents, Sandy McFall, Robbie Stanton and many of their counterparts retreated from the studio and instead assembled their work on screen and at home. With the finishing touches applied, the portfolios were submitted via the course site, removing the need to venture beyond the front door of the student flat. These activities apart, the design studio was nearly always the preferred learning space for this group of architecture students. It was a different story, however, for their counterparts in American History who were considerably more inclined to work in settings beyond the campus, reflected in the data that Heidi Green submitted within the journaling exercise.



Across the duration of a week, Heidi's essay charting the rise of feminism took shape in her kitchen and bedroom, different parts of the main university library, the student union and in Starbucks. Heidi explained that her choice of learning space was shaped by convenience (spending an hour between classes in the union), her love of coffee (Starbucks) and the combined quiet and absence of cost associated with spending lengthier periods in the library. In common with her American History peers, Heidi Green saw the student flat as having a series of distinctive advantages when it came to putting ideas down on paper or screen. Studying at home offered the benefits of being free from disruption during the daytime when flat mates were on campus (Debbie Harris), readily available refreshment

(John Brown), the guarantee of accessing a computer at those points in the semester when the library was at its busiest (Neville Smith) and the convenience of doing a bit of reading between shifts at the nearby supermarket (Heidi Green). These suggested strengths of home-studying were dependent, however, on the student's personal disposition and their particular domestic surroundings. Where Neville Smith valued the opportunity to control the ambient temperature of his flat, Ella Ness explained that the absence of central heating in her own accommodation meant she had spent large parts of the winter in the warmth of the library. My point here is simply that we need to remain alert to the varying circumstances and preferences that exist across a single group of learners, a point I will revisit during my concluding chapter.

It is important also to consider how the different types of campus spaces available to students contributed towards varying kinds of attachment with the bricks and mortar of Ancient City University. When Heidi Green settled down to write her essay in a café just beyond the campus, and Debbie Harris spread her notes across the settee of her shared flat, we should remember that they did not have access to the 'second home' that Sandy McFall occupied in the design studio. Therefore where the range of learning spaces documented in Heidi Green's journaling data suggests a high level of freedom to move between different settings, she did not have the option of spending time in a designated space equivalent to that enjoyed by her counterparts in Architecture. Also worth acknowledging is that where American History students typically had around 12 hours of scheduled classes each week (across three courses), the Architectural Design course was made up of exhibitions, presentations, review exercises, tutorials and other activities that required spending considerable amounts of time on campus. To this we can add practical activities such as welding and laser cutting that could only feasibly take place within campus workshops.

With a limited amount of contact teaching time and easy access to online course materials, American History students had much less need to be on campus compared with those participating in the Architectural Design course. And yet they told me about the considerable importance they attached to the physical spaces of Ancient City University. The availability of an extensive reading list of e-books meant that Heidi Green and John

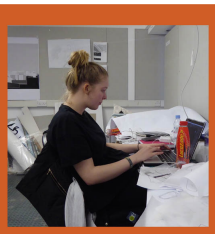
Brown rarely visited the library to browse the shelves, however it was a convenient place to spend time writing and reading between classes. The library also offered computers that could be used to correctly format an almost-complete essay (Ella Ness) and, from its fourth floor, offered views across Ancient City that were a source of pleasure and inspiration when composing an essay (Neville Smith, Ella Ness). The importance of learning on campus was also reiterated during interview conversation as students shared their expectations for the roll-out of lecture recording technology across Ancient City University (discussed from a commercial perspective in Chapter 5). The prospect of being able to access online video recordings was welcomed as a revision tool (Neville Smith), a way of filling-in detail missed during class (Debbie Harris) and to avoid falling behind on the rare occasions when illness meant being absent (Heidi Green). When a considerable amount of the critical interest around lecture recording has been concerned with the possible impact upon attendance (for contrasting perspectives see Yeung et al. (2016) and Bos et al. (2016)), John Brown, Heidi Green and Neville Smith were clear that being present in the physical space of the lecture theatre authenticated the university experience. It is significant that while streaming technologies make it possible to access teaching content beyond the campus, the lecture theatre was understood to perform a wider pedagogic, practical and symbolic function for these students. Therefore just as the design studio was at once a domestic and educational space, the lecture theatre similarly served a range of purposes. It is this multi-charactered nature of learning space that I now want to consider in more detail.

Studying, shopping, socialising: spatial identities of the 'classroom'

A prominent theme in the contemporary discourse around campus design is the value of designing classrooms and other spaces that have the flexibility to support a range of educational activity (Mulcahy et al. 2015; Dugdale 2009; Temple & Barnett 2007). With its raked lines of fixed seating, the lecture theatre is suggested to impose a pedagogic rigidity that is out-of-step with more student-centred and constructivist pedagogy (Boys 2011; Nordquist et al. 2011; Temple & Barnett; Oblinger 2006). Despite this, lecture theatres continued to be built at Ancient City University in order to accommodate growing student numbers, an approach reflected across the sector according to Boys (2011) and Temple & Barnett (2007). In her role of Teaching Spaces Designer at Ancient City

University, Veronica Rovelle explained to me that her work involved supporting the creation of lecture theatres alongside newer classrooms that could be flexibly rearranged, for instance as a workshop shifted from teacher-instruction to group work. In the final part of this chapter I want to propose that digital technologies nurtured a different kind of flexibility, as the flow of data lent the classroom a range of spatial identities. This will in turn offer a further perspective on the way that power circulates within educational settings, as students were able to resist the hierarchical communication of knowledge by establishing their own hybrid spaces.

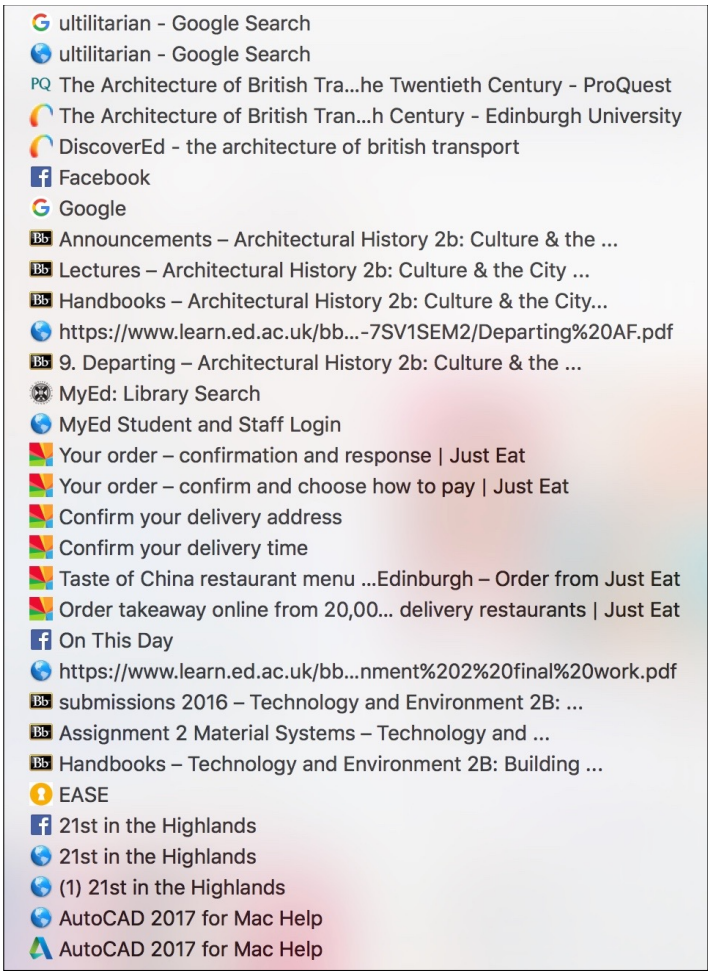
By the time that my field work was drawing to a close I had accumulated field recordings and photographs documenting the wide range of spaces represented in the earlier table. I had initially thought to organise these data using a loose categorisation of the settings where they were generated: study spaces (lecture theatre, tutorial room, design studio, library), social spaces (café, student union), domestic spaces (student flat, family home) or transitory spaces (train, plane, walking between classes). What soon became apparent, though, was the difficulty in assigning a learning space to a single category. As I listened back to field recordings from the design studio the rustling of paper was among the sounds that identified this setting as a learning space, however the laughter of students watching comedy clips on YouTube drew attention to some of the non-academic pursuits being followed. In the same way, my photographs from the lecture theatre depicted students diligently taking notes on Federalism and Watergate, while a scattering of their class mates dipped into Facebook and Whatsapp. In these examples, digitally-mediated activity lent the design studio and lecture theatre a social identity, while at the same time it continued to fulfil its primary purpose as an educational space. This was also more subtly apparent on the occasion I shadowed Yvonne Fisher as she reached the advanced stages of her library design project.



Shadowing Yvonne Fisher

The activities and spaces documented through the sounds, photographs and field notes within this video are typical of how Yvonne Fisher would spend each Friday in the design studio: talking through ideas with her tutor Isobel Law, searching online for architectural

precedents, sketching ideas on paper. This was punctuated by visits to the computer lab to scan then save these drawings to her pen drive. The impression given is of an extended period of study without deviation. What is missing from my photographs and field recordings, though, is the finer detail of Yvonne Fisher's screen-based activity. This was partly addressed by the screenshot that Yvonne shared with me which detailed her browser history for the period I had spent shadowing her.



Yvonne Fisher's Internet activity

What is apparent from Yvonne Fisher's Internet activity, but was not detected in the audio recordings and images within the video, is the way that her attention flickered between networked sites of architectural interest and resources without an obvious academic value. Seated at her desk, eyes fixed on her screen, Yvonne gathered information about the architecture of British transport from academic databases and the library catalogue. She

also looked for technical assistance on the AutoCAD help page, accessed her university portal to clarify assessment arrangements and then turned to Google for definitions of architectural terminology. This was interspersed with arranging the delivery of a take-away dinner, alongside Facebook discussion about a forthcoming camping excursion. Although the design studio was first and foremost an educational space, as Yvonne made plans for a birthday gathering in the Scottish Highlands and browsed the menu of her favourite Chinese restaurant, it also supported a social and a domestic spatial identity. Therefore when the flexibility of learning space is often associated with classrooms that can be rapidly rearranged to support different types of teaching, I want to suggest that the flow of data provided an alternative flexibility here, as Yvonne performed a variety of educational, domestic and social activities without needing to lift her gaze from the screen of her laptop, much less rising from her desk and chair. It is significant that, in this and similar examples, it was the who student exercised considerable power in negotiating a particular type of learning space. Where decisions around classroom configuration and technology tend to rest in the hands of university staff, here we see influence instead being exercised by the learner. This was not simply a case of altering the blinds or shuffling books around a desk, but through digital technology represented a more profound renegotiation of the physical environment that Yvonne had been assigned by the University.

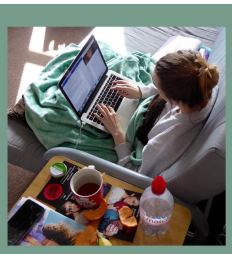
The digitally-mediated flexibility that I am proposing here evokes the idea of hybridisation that is used in different ways within the learning spaces literature. A hybrid space, according to Ravelli, is a way of recognising the potential for a single educational setting to support multiple purposes (2018). Elsewhere, Boys (2016) and Nordqvist & Lang (2015) instead use hybridisation to recognise the convergence of physical and virtual learning environments. By arguing that digital technologies help a single setting to support a range spatial identities, I have combined both of these articulations of hybrid space: Evelyn Fisher's corner of the design studio was hybrid in its ability to support a range of activities, but this was achieved through a physical-virtual hybrid of desk and data.

Switching attention to the American History course, the combination of academic, domestic and social pursuits unfolding in class was evident without needing to examine browser activity. From my seat at the back of the lecture theatre, the banks of computer

screens told a clear story of how attention would deviate from academic subject matter to more social pursuits. During interview conversation, Neil Jardine told me that the 'sinister glowing apples' that confronted him from the lectern did not reveal whether or not, on the other side of the screen, students were engaged with matters of American History. From the opposite end of the auditorium I was perfectly placed to observe how attention wandered beyond class themes, apparent in the flashes of colour that disrupted the grey-white glow of the word processor interface. This was also apparent on occasions when the distinctive buzz of a social media notification prompted a student's attention to shift from projection screen to smartphone. These examples, discussed in more detail in the next chapter, offer an alternative narrative to the relationship between networked technologies and learning spaces. As the literature and the data generated within my journaling exercise attest, the proliferation of online content and web-enabled devices have provided greater opportunities for learning beyond the classroom (Dugdale 2009; Randall 2015; Carvalho et al. 2016). These same networked technologies, however, also enabled students to engage in nominally domestic or social activities within designated teaching spaces.

The potential for a single setting to flexibly support a range of spatial identities increases as data transcends the walls of the classroom. This permeability further discourages us from thinking about learning spaces in a binary way (see in particular Boys 2011) and to instead recognise the fluidity and complexity of those settings where educational activity takes place (discussed in Chapter 2). As I have suggested, there are sensible and practical reasons for describing the design studio and lecture theatre as teaching spaces, however when the flow of data has no regard for partitioning walls between classrooms or the campus perimeter, we need to recognise these educational settings as also potentially having a domestic, social or other spatial identity. Towards the beginning of this chapter I proposed that the digital projection of voice and visual content helped to reiterate the hierarchical epistemology and pedagogy of the American History course. I now want to argue that, by entering digitally-mediated social or domestic spaces, students resisted or became somewhat immune to this passing down of knowledge.

If we imagine that social, domestic or commercially-oriented data permeates the walls of the classroom, we equally need to consider how the digital flow of academic content affects the identity of settings beyond the campus. The most obvious example of a domestic space within my fieldwork came when I shadowed Debbie Harris as she wrote about Lyndon Johnson's landslide election victory. This included spending an afternoon in her student flat where she curled up beneath a blanket on her couch, sipped tea and typed notes. In this video the lip salve and drying rack, accompanied by the sound of a reality television show, deftly capture the domestic character of Debbie Harris' shared student flat. At the same time, audible traces of typing and photographs of Debbie's paper and screen-based notes mark this out as an educational space. Although there is nothing remarkable in a student choosing to compose an essay in the shabby comfort of her flat, when Debbie Harris logged into the virtual learning environment of the American History course, before casting an eye across e-books accessed via the library catalogue, we might see her as being simultaneously present in both domestic and institutional learning spaces. The flexibility of this learning space was achieved through Debbie Harris' ability to access online all the academic resources she needed to complete her essay, while also being able to reach for the fruit, tea, hot water bottle and other domestic trappings that made this a setting conducive to expounding on presidential nominations and political intrigue.



Shadowing Debbie Harris

From Debbie Harris' flat, it was four flights of stairs and a short walk to the jazz cellar bar where Ella Ness worked on her own history essay. Between the first performer striking up a tune at 5pm, and staff calling last orders just before 3am the following morning, Ella would examine course readings on her smartphone and compose ideas on her Chromebook. As she syncopated her screen-based reading and writing with the live soundtrack, the subterranean setting of the jazz bar became a fusion of educational and social spaces. Ella explained that, at the point in the evening when the house lights were dimmed, she would use the torch on her smartphone to illuminate her writing pad, an improvised approach which echoes Gourlay & Oliver's experiences (2013) as they

investigated the digital literacy practices of students across a range of learning spaces (as discussed in Chapter 2). Once again, a single setting supported a range of spatial identities, accentuated by the flow of data and the proliferation of digital technologies. The lecture theatre is a learning space but, on the occasion where I observed a student bidding for jewellery on e-bay, it was also a market place. Meanwhile, as Ella Ness and Lizzie Green made clear during interview conversation, the café often provided a more productive essay-writing space than the library, computer lab or other dedicated educational corners of the campus. For both Ella and Lizzie, the ability to work effectively was associated with being in environments where they enjoyed spending time. Amid shifting patterns of light and sound in the jazz bar, Ella was able to find a focus and rhythm to her writing that she could not establish in her shared flat or the university library. For Lizzie meanwhile, music and decent coffee were an incentive to knuckle down to her essay, rewards that were not available in the conventional learning spaces of the campus. What we see in these examples is that what constitutes a positive learning space is shaped by the individual student's disposition, rather than something that can be broadly associated to the arrangement of desks, strength of wifi connection or attempts to exclude noise.

This does not mean that digital resources necessarily dilute the essence of different spaces to the point that they become indistinct: clearly, the classroom, café and train carriage retain their own ambience and physical character in spite of digital connectivity. My point, though, is that digital technologies, and the activities they support, invite us to question the discrete physical and conceptual demarcation of learning spaces.

Conclusion: Thinking Space

In this chapter we have visited a wide range of settings where the presence of digital technology nurtured particular epistemologies and power dynamics. Beginning in the lecture theatre we saw how the emergence of presentation software had enabled Andrew Marks and his colleagues to shape a more visually-oriented learning environment and pedagogical approach. It was significant, though, that the imminent roll out of new image-based technologies might curtail these powers through questions of copyright. Turning attention to sound, it became apparent that the design and arrangement of audio

technologies helped to reiterate hierarchical assumptions about the nature of knowledge and classroom power relations. In contrast, the absence of these technologies in the studio exposed a more collaborative ambience within the learning spaces and practices of Architectural Design. Allied to this, Architecture students had a considerably greater influence over the character of their teaching spaces compared with their counterparts in American History, where the regimentation of the lecture theatre echoed the structure of the course itself.

The influence of digital technology was even more apparent as we ventured beyond the campus to the ostensibly domestic, social and transitory settings where students spent time drawing, designing, reading, writing and reflecting. We saw how Ella Ness, Debbie Harris and their fellow American History students used mobile technologies to establish impromptu learning spaces. In the case of Architectural Design meanwhile, the portability of the laptop and the power of software packages enabled Matthew Redfearn and Astrud Bextor to establish learning spaces where they did not previously exist. In all of these examples however, digital technologies were implicated in the negotiation of learning space alongside a wide range of social and material interests: pedagogy, personal disposition, procurement decisions, pre-existing classroom layout, and beyond. It was the particular assemblage of these pressures and opportunities that helps to explain why digital technologies did not uniformly affect learning spaces across the different courses and the individual students who occupied these settings.

If a recurring theme of our excursion has been that digital technologies are implicated in the negotiation of learning space, then we have also come to appreciate the complexity and fluidity of those settings where educational activity takes place. As we have looked and listened from the back of the lecture theatre, and then dropped into the library, café and student flat, we have come to see how the proliferation of digital technologies and the flow of data has disassembled the conceptual boundaries of the classroom. Instead, a single setting has been shown to support a range of spatial identities. Therefore where the current fashion for learning space design concerns the creation of classrooms that can be flexibly adapted to suit a range of teaching approaches, we observed a more profound and digitally-mediated flexibility, as Yvonne Fisher swiftly moved between academic,

domestic and social pursuits without so much as lifting her gaze from the screen. In this way students from both courses were able to resist or reconfigure the pre-existing assumptions around pedagogy and epistemology associated with their learning spaces and academic subjects.

As I will discuss at more length in Chapter 7, the two arguments I have advanced in this chapter have important implications for teachers, educational technologists and space designers. First, while classroom technologies are purchased and then used in line with particular assumptions about pedagogy and the nature of knowledge, digital resources can equally be used in ways that are counter to the intentions of the teacher or the institution. My earliest impression of the lecture theatre and the design studio, reflected in the discussion towards the beginning of this chapter, were of spaces that could be defined in straightforward ways by the presence or absence of hierarchy. What we have instead seen is a need for nuance when thinking about the nature of space, particularly in relation to the influence of digital technologies within those settings. The practicable value of this observation is to discourage us from assuming that the arrangement of seating or installation of audio-visual systems can singularly shape the nature of a learning space and its associated learning practices. Or to borrow an example from this chapter, the 12 ceiling speakers might have projected Timothy Stone's voice to all corners of the lecture theatre, but we cannot assume that his voice would have been heard.

Chapter 5. Commercial Space

Introduction

From a sociomaterial perspective, the classroom is performed through its physical fabric and the presence and practices of students and teacher, but is also contingent on a much wider body of political, historical, cultural, technological and financial agents. It is the last of these interests that provides the context to this chapter as I examine the learning spaces of the American History and Architectural Design courses in the context of an increasingly neoliberal educational landscape. Neoliberalism, as I will come on to discuss, has become a catch-all term for the growing commercialisation and market-oriented focus of the university. The central argument of this chapter is that digital technologies are deeply implicated in the neoliberalisation and commodification of higher education spaces and the practices they help to engender. Having argued in the last chapter that a learning space can be both physical and networked, as well as domestic and social, it can also simultaneously support the pursuit of knowledge and profit. Across campus and screen, digital resources have become interwoven in advancing the neoliberalisation of contemporary educational environments.

To make the argument that digital technologies are complicit in the commodification of educational space I am going present a series of vignettes from my fieldwork. These will be drawn from three different types of learning space. Beginning in the comfortable surroundings of the History Department café, I will argue that the creation of hybrid spaces (see Chapter 3) where students simultaneously enjoy refreshment while accessing networked educational content, has indirectly contributed towards the reimagining of the student as a customer. From there I will discuss how the procurement and installation of a lecture recording system exposed how educational practice is subject to the interests of commerce and the competition between universities. Finally, taking a seat in the back row of an American History lecture, and then perched on the edge of a desk in the Architectural Design studio, I will argue that through the combined effects of algorithms, adverts and the attention economy, the screen is transformed into a market place as well as a learning space. In each case, my discussion depends on the conceptual foundations

of sociomateriality as well as the framing of learning space I offered in Chapters 2 and 3. Before doing any of this, however, I am going to set the scene by turning to the growing body of literature around the neoliberalisation of higher education.

The neoliberalisation of higher education

Neoliberalism describes a social, political and economic philosophy where governmental control is scaled down in favour of ceding influence to the market. The central assumption of neoliberal ideology is a laissez-faire approach to state intervention and funding, thereby creating space for competition and customer-choice to drive up efficiency and quality. Although its roots lie in discussions between liberal scholars of the 1930s, neoliberalism has more recently become a catch-all term for deregulation, privatisation, globalisation and other economic and political strategies that privilege the impetus provided by the private sector. The effects of neoliberalism have been keenly felt within the university sector over the last two decades, prompting wide-ranging debate that has highlighted the growing competition between universities (González-Calvo' & Arias-Carballal 2017). This is seen, for instance, in the way that institutions attempt to carve out a share of the lucrative market for international students (Komljenovic 2017) while being ranked in highly publicised league tables (Dodds 2011). In consequence, the guidance offered to prospective applicants has become a marketing opportunity (Robertson 2016), supported by sophisticated paper and screen-based publicity materials that at times advertise a lifestyle over the finer points of an academic programme (Ledin and Machin 2015). This orientation towards the market has reconfigured the student as a customer (Introna 2016) while the lecturer's academic identity has been jeopardised (Archer 2008), prompting calls for staff to resist the language of neoliberalism in order to avoid being complicit in undermining the social and moral importance of the university's intellectual work (Davies & Petersen 2005). While Davies & Petersen raise the possibility that the quickening pace of educational work, alongside the pressure to perform, might appeal to the survival instinct of some academic staff (2005), the pervading picture is that neoliberalism imperils the distinct character and quality of the academy that has been nurtured over centuries of tradition and thought.

I have referred here to the interests of higher education in a way which suggests that institutions exist with a common, single purpose. It is important, however, to acknowledge that a range of missions exist across the sector, influenced by tradition, geography, economics and other interests. Casting an eye back to the philosophical corner stones laid down at the establishing some of the UK's earliest seats of learning, Smith & Langlow (1999) describe how the ancient Scottish Universities were established with a broader curriculum and more egalitarian ethos than their predecessors in England. Several centuries later the Humboldt model of university in Germany would prove influential through its emphasis on research and graduate study. Although all universities would surely profess a commitment to critical thought, Barnett (1997) makes that point that institutions are vague on what this means in reality, not least when it is a concept that is differently understood and practiced across the disciplines. In a separate discussion around the changing face of the academic world, Barnett makes the point that a research-led institution with an international standing and vast income has little in common with a community college (2004). We might also compare how the vocational orientation of the UK's 'new universities', attributable to their history as polytechnics, means that they offer a more natural fit for the neoliberal emphasis on employability, compared with more 'traditional' institutions, with their broader portfolio of more overtly academic degree programmes. This differentiation across the sector is significant because, as will become apparent as the remainder of this thesis unfolds, the commodification of learning space is subject to the specific social and material conditions of a university.

From a learning spaces perspective it will prove helpful across this chapter to think about neoliberalism in relation to the mission of Ancient City University in particular. In common with other prestigious institutions, Ancient City University's mission statement advertised a commitment to high quality research, teaching excellence and the construction and distribution of knowledge. It also talked of producing high calibre graduates while contributing to the nation's economic growth. This coheres neatly with the language of neoliberalism, however the mission statement also talks of promoting health, sustainability and cultural well-being. Focusing on the last of these purposes, during the course of my field work Ancient City University made a considerable effort to recognise and acknowledge its civic duty, including the positive role it had to play in the surrounding city.

This was set out in detail within a community engagement strategy which made clear that the university saw itself as having a mission much wider than the teaching and research that institutions are most readily often associated with. Therefore where neoliberalism is often presented as being in conflict with the educational aims of the academy, it is worth acknowledging that institutions like Ancient City University recognise themselves as having a much wider purpose, a theme that will be particularly important from a learning spaces perspective towards the end of this chapter.

The case for a more neoliberal higher education sector has often been articulated through an emphasis on performativity, accountability and in particular the need for efficiency that is seen to more closely mirror the conditions of the private sector. Kupriyanova et al. (2018) offer an extended discussion of the impetus and limitations behind a drive for educational efficiency, drawing attention to the challenge this represents as institutions attempt to adopt approaches from the commercial world without diluting their wider purpose. The drive for efficiency, as Duan (2019) describes, has been used by governments to justify a reduction in university funding, with the emphasis instead falling on institutions to take a greater role in generating their own income. The rationale that is sometimes offered is that it should be within the capabilities of universities to be more financially independent, without the need for special status and state support. We should be wary, though, of assuming that the recent introduction of tuitions fees within UK universities represents a break from a long-standing tradition of free education. While acknowledging the considerable change that has taken place across the landscape of higher education, Smith & Langslow (1999) note that it was only in the latter part of the 19th century that universities became entitled to receive state funding, before which time they depended on the income of student fees. This is not to dismiss the impact of the contemporary changes in funding, but simply to acknowledge that for the greater part of it history, western Higher Education has relied on student, rather than state, funding.

The declining entitlement to government funding has been seen to prompt universities to think about more effectively deploying their resources, particularly towards those activities that can have a tangible impact upon the nation's well-being (see for instance Guilbault 2016). This most obviously refers to equipping graduates with the qualities that generate

wealth, for themselves and for the nation. From a neoliberal perspective, institutional efficiency is also seen to engender the conditions necessary to raise teaching standards and the wider quality of education that is on offer. In a culture of measurement and accountability, educators have become expected to more readily demonstrate their value, whether through an ability to attract research funding or the quality of their teaching, as measured by surveys of student satisfaction. Parkinson and Chew (2016) argue that in an environment of rising tuition fees, marketisation and emphasis on value-for-money, institutions and individuals have come under greater pressure to show their worth, apparent through a growing emphasis on teacher professionalism. Efficiency therefore applies to institutions but with the repercussions permeating to individual staff and beyond, as we will come to see.

In a societal climate of accountability there has become an expectation that universities should fall into line with other publicly-funded bodies whose continued existence depends on an ability to demonstrate impact and value for money (Levidow 2002). Conflict emerges, however, when resources and activities are seen to be skewed towards a pre-defined 'pursuit of excellence' that might not be sympathetic to the wider mission of the university. What matters is what is measurable, whether that means retention rates (Guilbault 2016), student satisfaction (Introna 2016), employability (Abbas et al. 2012) or any other performance indicator that shapes institutional strategy or attracts funding. From this perspective, the value of a subject or discipline can be measured by the employability and wealth generation of its graduates, rather than its rigour or the critical thought it might engender. The syllabus of the degree programme can be tailored towards employability in order to attract the interest (and later the fees) of prospective applicants (Abbas et al. 2012), and the validation of graduate recruiters (Morley & Aynsley 2007). Research grants are channelled towards the disciplines that are seen to have a direct link with commerce, economic growth or another tangible benefit for society (Dodds 2011). Academic departments concerned with science, engineering and technology are seen to be adept at attracting funding from government and consultancy, while colleagues in the humanities reflect on what might be done to enhance their standing and secure their existence (Braidotti 2013). The tension between responding to wider societal change while at the same time sustaining academic integrity is captured by Chau who proposes that we have

yet to see whether the benefits of universities becoming more responsive to the interests of students justifies 'the shift towards commodification of knowledge and corporatization of higher education' (2010: 189).

Introna, Braidotti and Chau all take the position that digital technologies are implicated in nurturing the conditions that support the neoliberalisation of higher education. This can also be found in the critique of the algorithms operating within educational software (Edwards & Carmichael 2012) that, as I argue below, were shown to shape the construction of knowledge within the architectural design course. Elsewhere Knox (2014) draws attention to the profit motive behind the commercially-owned platforms that support online learning. Meanwhile Land more fundamentally highlights how 'technology is mobilised in a specific way which sits uncomfortably with disciplinary culture' as 'higher education becomes caught up in the performative agendas of globalised market rationalism' (Land 2006: 100). The performativity referred to by Land, and viewed by Kitchin (2017) as being embedded in the algorithms upon which digital technologies depend, describes a commitment to measurable impact, results and achievement. This interpretation of Lyotard's performativity (1979) is a recurring theme in the discourse around the neoliberalisation of education. A pointed definition of performativity is offered by Ball who refers to:

> a powerful and insidious policy technology that is now at work at all levels and in all kinds of education and public service, a technology that links effort, values, purposes and self-understanding to measures and comparisons of output. (2012: 19).

These supposedly measurable qualities are, according to Olssen & Peters (2005), the basis upon which university outputs are evaluated, for instance through audits, strategic plans and performance indicators. The significance here lies in a diversion away from intellectual endeavour, civic duty and other of the academy's mission, instead to the satisfaction of what Olssen & Peters regard as sometimes ill-founded or tenuous judgements of quality.

When universities are publicly evaluated in the National Student Survey (discussed in more detail below), an institution's standing is influenced by an ability to meet the

approval and expectations of its student body. From a neoliberal perspective, at the point when a learner recognises herself as a customer as well as a student, triggered perhaps when she sees the course fees associated with her chosen degree programme, she is more inclined and able to demand high quality teaching and facilities. The assumption here is that universities are pressured to deploy their human and financial resources in ways that are most likely to support excellence, employability or other objectives that the market demands. Towards the end of the first semester I had a conversation with Neville Smith (American History student) about the roll-out of lecture recording technology at Ancient City University. Neville acknowledged the concern of some academic staff about the likelihood of declining classroom attendance but told me that, in light of the cost he was incurring to attend university, he had the right to decide how and where he would access academic content. That students identified themselves as learners as well as customers was articulated in a slightly different way by Heidi Green who told me that, when she was having to meeting the considerable cost of tuition, she would be present in every class in order to get her 'full money's worth'. For Heidi and Neville, the passion they showed for the American History course and university in general, was married with a desire to exercise their power as fee paying consumers of education.

Turning attention from learners to learning spaces, neoliberalism is rarely discussed directly within the literature, even if its symptoms are to be found in the rationale behind the redevelopment of higher education real estate over the last two decades. As I will discuss in relation to the lecture recording system at Ancient City University, a drive to improve student satisfaction, attract applications and generally communicate the prestige and status of the institution provided the impetus for rolling out this technology across campus. Further afield, in her discussion of educational space at the University of Auckland (2015), Locke describes how neoliberalism and globalisation were implicated in the demand for large class teaching and therefore the physical character of the campus. In the setting of an un-named US university meanwhile, Kuntz et al. use the example of staff and students transitioning into an academic building to argue that, 'an implied rationality of economic efficiency' at the point of renovation had the effect of re-inscribing neoliberalism through the contemporary classroom and the built environment (2012: 436). In this way the material fabric of the university reiterates institutional identity and

ideology while also, according to Kuntz et al., being a response to the prevailing neoliberal climate of higher education.

Learning café culture

The contemporary university, as I have already discussed in Chapter 4, is increasingly characterised by flexible learning spaces that exploit the potentialities of online education (Johnson & Khoo 2018; Dugdale 2009) and the proliferation of digital devices (Carvalho et al. 2016; Thomas 2010). The development of campus spaces, it has been argued, should take into account the assumed technological proficiency and practices of students, combined with the ease of accessing academic content through a mobile network. I have noted the conversion of thoroughfares to 'think stops' (Lomas & Oblinger 2006) where students can pause to check email or enjoy an impromptu meeting with tutors or peers. Conversation can continue in the 'learning commons' (Coulson et al. 2015; Lomas & Oblinger 2006), known more plainly as the library prior to the erection of smart boards and study pods with computers for collaborative use. When she wearies of group discussion, the student might seek refreshment from the recently established coffee stand in the foyer. If she first favours a bit of exercise there is the option of strolling to any number of cafés that have popped up around the campus. With connectivity and networked learning in mind, her chosen café will have been designed with power points and USB sockets. A message will periodically appear on the wall-mounted screens, offering advice to the uninitiated undergrad on how to register with the university's wifi service. It was in one of these cafés, documented in the following video, that Evelyn Hopkins held office hours for her American History students. On this occasion, I have found it more meaningful to juxtapose field recordings and photographs with excerpts from the literature.

The learning café

Located at the entrance to the History Department, 'Earth Café' as I will refer to it, sought to attract passing students and staff with barista-prepared coffee and a range of light snacks. As the video shows, these refreshments could be enjoyed in a brightly-lit area of sleek tables, high stools and sofas. The informal, conversational ambience of the café

aligned with the relaxed discussion that Evelyn Hopkins advertised during tutorials, as she encouraged students to drop in and talk through an essay plan or any episode of American History. The setting described here provides a clear illustration of the learning café as described by Coulson et al. (2015), as well as the type of flexible space that is seen to support opportunities for mobile learning before and beyond scheduled classroom teaching (JISC 2006). Adjoining Earth Café was a lounge space that had, prior to the most recent re-build, accommodated an administrative counter, pigeon holes and a thoroughfare to teaching rooms and academic offices. The converted setting offers a good example of what Lomas & Oblinger refer to as the 'think stop', a place for 'individuals to stop, relax, and meet others', thereby encouraging 'impromptu meetings and conversations' (2006: 5.7).

Across my fieldwork I was a frequent visitor to the space described here: it was a useful place to check email, review my field notes and speak with members of the American History class. As I surveyed my surroundings it was evident that Earth Café and the adjoining lounge area supported a range of spatial identities (see Chapter 4). This was a place for refuelling between classes, streaming videos, updating Facebook status and staging meetings. It offered a setting for buying, drinking, writing, reading, chatting, browsing, thinking and, in my case, observing. During one visit I inadvertently found myself seated within ear-shot of what I assumed to be an impromptu sociology tutorial. Unfortunately a pre-arranged appointment with a member of the History teaching team forced me to depart prematurely from the discussion around globalisation, meaning I was unable to ask the tutor whether the choice of venue was down to her preference for informal learning spaces, a timetabling clash or simply the challenge of finding a designated classroom at short notice. In the context of this chapter, however, I want to think more about the significance of these kinds of activities taking place in a setting that served a commercial purpose.

Earth Café was overseen by 'Ancient City Premier', a commercial arm of the University that managed a portfolio of accommodation and venues. In the years leading up to my fieldwork, Ancient City Premier had established a series of attractive new café spaces across campus, often located in prominent locations adjacent to the entrance of University

buildings. As the following field note records, these were café spaces but also at the same time work spaces, where refreshment merged together with reading and critical reflection:

> Office hours in Earth Cafe. The walls are painted in the University's colours. It's corporate rather than a 'proper' cafe. Conversation and earphones. Evelyn Hopkins in the middle of all this, offering feedback on an essay plan.
> *(Field note from office hours in the American History course, semester 2)*

Over a longer period of time the canteens, refectories and staff club that once supplied generations of scholars with subsidised platefuls of hot food had largely disappeared from the campus. Spaces like Earth Café offered a narrower menu but, through Internet connectivity combined with a study-while-you-snack ethos, a broader function than the spaces they succeeded. The ambience of Earth Café and similar spaces across Ancient City University was *sophistication* over *sustenance*, sometimes nurtured through a soundtrack of gentle electronica and the aroma of roasted beans. Vibrantly-coloured textiles and natural wood resembled the furnishings found in pages of a Danish design catalogue. Sit back, relax, sip coffee, study.

There is a parallel here with the attention that publicans give to lighting and décor in order to attract patrons (Edensor & Sumartojo 2015), and also how supermarkets use muzak to entice customers to linger, browse and buy (Sterne 1997; Radano 1989). The comparison with those overtly commercial settings is only partly true, however: as Neville Smith and Ella Ness waited to talk through their essay plans with Evelyn Hopkins there was no obvious pressure from café staff to make a purchase or move on. Some students, I noted during my fieldwork, had a talent for nursing a cup of fruit tea for the duration of a morning, or however long it took to apply the finishing touches to a history essay. Nevertheless, when Earth Café had a profit-turning purpose, and the conceptualisation of space has been shown to be closely associated with behaviour (Johnson & Khoo 2018; Melhuish 2011; Jamieson 2003), then that corner of the campus took on a commercial flavour. In this setting the learner was a student-customer: the institution was interested in her education, welfare and contentment, however when Ancient City Premier was a revenue-generating arm of the university, also her cash.

This conceptualisation of the campus as a commercial space, and its occupants as consumers, is consistent with neoliberal ideology but sits uncomfortably with some of the cherished notions of the academic project. When the learner merges into the figure of the student-customer there is an erosion of what Collini describes as the:

> protected space in which various forms of useful preparation for life are undertaken in a setting and manner which encourages the students to understand the contingency of any particular packet of knowledge and its interrelations with other, different forms of knowledge. (2012: 56)

Collini is referring here to space as the educational context or environment, rather than the physical setting of the campus. Nevertheless, his questioning of the increasingly performative and commercially-oriented emphasis of UK higher education - or what he labels 'HiEdBizUK' - can also be applied to the material fabric of the university. The campus café that is expected to turn a profit, in common with the lines of merchandise on sale in the University's visitor centre, can be seen as the inevitable by-product of government policy which has made institutions increasingly dependent on self-generated revenue. Profits from the sale of buffet packages and branded sweatshirts were not the primary business of Ancient City University, but they generated revenue that could be ploughed back into other areas of the institution's work. Although the framing of the learner-as-customer has been shown to be deeply unpopular among academic staff, it is a status according to Ng & Forbes (2009) and Bay & Daniel (2001), that students appear to have accepted. Perhaps it is simply the case that, having agreed to part with thousands of pounds in order to experience the advertised benefits of a university experience, students are not inclined to dwell unduly on the cost of a cappuccino and how it defines their status in the eyes of the university.

In my discussion of the literature in Chapter 3 I remarked that recent spending on campus redevelopment has rarely been accompanied by research measuring educational impact (see Temple (2007) and Brooks (2011) among others). This might be attributable to what Goodyear et al. see as the reluctance of education researchers to involve themselves in actionable knowledge around learning spaces (2018), and exacerbated by the different languages spoken by architects, estate managers and academics (Boys 2011). It needs to

remembered, though, that academic quality is only one of the purposes of the contemporary university. The vacuum of evidence connecting learning spaces with learning outcomes has sometimes been filled by an emphasis on creating environments that are viewed favourably by learners. In her role as Teaching Spaces Designer, Veronica Rovelle helped to oversee a survey that invited staff and students to share their experiences and attitudes towards Ancient City University's learning environments. In the most recent survey, 624 students had responded to a range of questions around room layout, furnishings, acoustic quality, wifi coverage, support for mobile devices and similar themes. This feedback, Veronica told me, would then be used to inform the planning and design of campus spaces. What the survey did not attempt was to connect campus space with evidence of improved knowledge acquisition, attainment or other educational outcomes. It needs to be acknowledged, however, that providing convincing evidence of educational improvement is a notoriously difficult undertaking when so many different factors influence what takes place in and around the classroom. The survey described here would seem an appropriate way of helping Veronica Rovelle and her colleagues to understand how different teaching environments were being used, while getting a sense of the classroom and campus features that students and staff felt were conducive to learning and teaching. Veronica was clear that the survey aimed to help the University provide an appropriate portfolio of high quality teaching environments. Looking more broadly, we can see that deploying resources in line with the expectations of learners offered the possibility of improving Ancient City University's performance in high profile rankings that were recognised to be of considerable strategic importance.

Since 2005, the *National Student Survey* has been inviting final year students to anonymously share their experiences of university or college. It is administered by the market research company *Ipsos* on behalf of the *Office for Students*, a regulating body within the *Department of Education* of the UK government. If, as its authors claim, the results generated by the NSS have the potential to shape the decision-making of prospective applicants, then they can also sharpen the minds of university managers concerning the direction of resources and strategic priorities (Ball 2016; Dodds 2011). It is worth noting that the physical space of the university does not feature among the seven themes that the NSS sets out to investigate, although questions around learning resources

and overall satisfaction provide some leeway to elicit data. It is also interesting to consider Temple's view that campus facilities have tended to show up less prominently than teaching and other themes within surveys that have evaluated what matters to students (2007; 2008). All the same, when the neoliberal educational landscape situates universities in direct competition for applicants and the fees they bring (Ashwin et al. 2013; Abbas et al. 2012), the perceived quality of the physical learning environment provides an obvious measure of comparison and competition. In the case of Ancient City University in particular, this included how the university was perceived against other prestigious international institutions, as well as its placing among members of the *Russell Group* of elite UK universities.

Having already noted that the degree has become a marketable commodity within the neoliberal landscape of higher education, the university's physical estate holds a similar status when it is visually repackaged and 'oriented to presenting students as customers who will acquire a degree' (Ledin and Machin 2015: 2). The 'competitive world of higher education', according to Edwards, has created a heightened awareness that 'university architectural quality matters' (2000: 5). This is reflected, according to Bayne et al. (2013) in marketing materials that anchor academic authenticity to the institutional estate. University prospectuses and websites are busy with images of students strolling amiably around campus, before pausing to smile in front of those buildings that present the most alluring depictions of the institution. In the case of Ancient City University, modernity was projected through structures of glass and steel, while tradition and quality were rooted in pictures of its classical columns and mock-baronial halls. When the campus is a material embodiment of the university's values (Neuman 2013) conveyed through the medium of architecture (Edwards 2000), it can help to shape its standing in the eyes of audiences within and beyond the institution. In his work around the architecture of university buildings, Neuman argues that investing in the campus is a way of demonstrating quality and permanence to former students and the wider public (2013). When Ancient City University, like its competitors, worked hard to attract donations from alumni, benefactors and funding bodies, the visual and physical representation of the institution could act as a touchstone of quality.

It is worth reiterating my earlier point that universities have their own particular mission statements and strategies that can in turn influence the size and form of capital projects such as campus redevelopment. Therefore the lack of evidence connecting campus development with educational improvement need to be considered against the broader mission of the university and the range of purposes served by its estate. Returning to the setting of Earth Café, irrespective of whether it was conducive to office hours or tutorial conversation, these types of environment can be seen as helping the university to recruit students, project status and attract funding, while at the same offering a reasonable coffee and ciabatta.

The complex case of lecture recording technology

During the period of my fieldwork, Ancient City University began to roll out a lecture recording system across its major teaching spaces. Lecture recording, or 'lecture capture' as it is more commonly known, involves generating an audio-visual recording of classroom teaching which is then made available to students, normally via the institution's learning management system. Lecture recording has tended to be positioned as a way of augmenting rather than replacing what takes place in class. This was the rationale attached to 'Review', the name I am using here in place of the branding assigned to the system within Ancient City University.

Over the last decade lecture recording technologies have becoming an increasingly common feature of higher education learning spaces (Danielson et al. 2014; Elliott & Neal 2016) as universities have, among other reasons, sought to exploit the ways that video recording, streaming and networked platforms increasingly enable learning to extend beyond the classroom. This has provoked considerable critical interest as researchers have examined the impact upon academic performance (e.g. Traphagan et al. 2010; Owston et al. 2011) and attendance (Yeung et al. 2016; Bos et al. 2016), even if the picture remains unclear in each respect. Other studies have investigated whether lecture recording is conducive to particular learning styles and interests (e.g. Bassili 2008) or groups of learners (e.g. Leadbeater et al. 2013). Elsewhere research has been undertaken into the popularity of lecture recording among students (Danielson et al. 2014) and its reception by academic staff (O' Callaghan et al. 2017). Turning to my own fieldwork, interview

conversation with students and staff reflected a range of expectations around lecture recording, albeit prior to Review coming into use. Instead, my interest lies in what the procurement and installation of the system can tell us about the commercialisation of educational space. The discussion that follows benefited from discussion with Nina Reid who, in her role of Learning Technology Manager, was able to help me understand the impetus and acquisition behind the Review system. Further insights were provided by one of Ancient City University's learning technologists, Kris Green, who talked me through some of the technical and practical issues around installing Review. Further background was found within University documentation, including materials that were used to advertise and explain Review to staff. This included blog posts and other website content, as well as presentation materials and paper-based documentation.

The primary aim of rolling-out lecture recording, as presented on the Ancient City University website, was to enhance student satisfaction with learning resources, while at the same time meeting requirements around inclusive and accessible learning practices. This position is revealing in the way that it foregrounds raising student *contentment* when it might instead have articulated a commitment to enhancing student *learning, performance* or another educational purpose. The privileging of improved satisfaction is consistent with the neoliberal framing of the learner as a customer. This is not to suggest that Review was introduced without an eye to likely pedagogical value. On the contrary, beneath the overarching advertised purpose, it was suggested that the system would bring opportunities for innovative teaching with technology, improve access to educational content, reduce the need to take notes in class, and provide additional support to learners with a first language other than English. More practically, it was argued that the system would offer a back-up on those occasions when students were unable to attend class. Nevertheless, as Nina Reid explained to me, student pressure had provided a considerable impetus towards the university taking a position on the campus-wide use of lecture recording. For some years prior to the articulation of a dedicated strategy, the issue of lecture recording had been a rallying cry in the manifestos of prospective student association representatives as they sought election by their peers. More collectively, a call for the widespread use of lecture recording had been part of a campaign by *Ancient City*

University Students Association demanding improved provision around accessibility and inclusivity.

The case for lecture recording that Nina Reid and her colleagues took to university management emphasised the considerable risks associated with the absence of a cohesive strategy for recording and streaming teaching. The reduced ability to recruit non-native English speaking students, a fall in standing compared with global competitors, declining scores in the NSS evaluation and a negative impact upon the institution's performance in the *Teaching Excellence Framework* were all presented as consequences of failing to roll-out lecture recording across the University. We get a picture here of the way that, in the neoliberal setting of contemporary higher education, investment in learning technology is tied to pedagogy but also perceptions of institutional quality, competitiveness against other universities, the ability to recruit students, and financial stability. The instrumentalist framing of technology described here, where lecture recording was presented as a remedy for pre-existing educational inefficiency or threat, needs to be placed in context. Nina Reid and her colleagues were hoping to sway senior management towards spending several million pounds. To make this case convincingly it made sense to justify the outlay in line with a number of strategic challenges facing the university, not least its below par performance in the NSS. From a sociomaterial perspective, the relationship between education and technology is rarely so straightforward in practice, not least because this kind of instrumentalism denies the ways that digital resources are imbricated in what unfolds in and beyond the classroom.

The framing of lecturing recording as a form of enhancement to learning is problematic when, according to Bayne, it casts technology as being subservient to human interest, thereby failing to recognise 'the disruptive, disturbing and generative dimensions of the academy's enmeshment with the digital' (2014: 7). A lecture recording system, like other educational technologies, does not exist as a neutral resource but instead has the potential to shape educational practices and spaces in unexpected ways. As Clegg et al. argue, technologies are never neutral but 'always the products of real historical social relations as well as the emergent technical capacities they provide' (2003: 39). From the perspective of Bayne and of Clegg et al., we can neither deploy digital technologies with

the assurance of realising pre-set educational outcomes, or being able to confidently anticipate their wider impact upon learning practices and spaces. An example of the way that digital technologies are enmeshed with wider historical and social relations was aptly demonstrated during a period of nationwide industrial action that coincided with my field work. As the newspaper media reported at the time, while academic staff were picketing across Ancient City University campus, in some instances recorded versions of postponed lectures were made available to students via the recently installed Review system. This provoked criticism from staff and their representative union around the misuse of academic content, a feeling that persisted beyond the point that industrial action drew to a close. This neatly illustrates how the relationship between digital resources and learning space is simultaneously performed through an assemblage of pedagogical, technological, strategic, political and other actors, brought together in complement and conflict.

Having gained the necessary approval to roll-out lecture recording, Nina Reid and her colleagues embarked on a procurement process that would be shaped by some of the same priorities and pressures described above, but also by financial, legal, technical and more practical issues. Beginning with a pre-qualification exercise that used scale and insurance to identify a list of possible suppliers, the procurement process took place across four months of discussion, demonstrations and deliberation. This included setting in motion a process of 'competitive dialogue' where the university was able to finesse a tender based upon the systems available on the market. In light of the costs and complexity involved, a scoring method was devised that sought to strike the right balance between quality and cost, albeit with an emphasis on the former in order to select 'the right system, not a cheap system' as Nina Reid explained. This was recognised to be a challenging but vital approach when each of the three possible systems had their own strengths and limitations. Educational activity is thus shown to be contingent on budget, but in conjunction with the relative importance of teaching quality, student contentment, institutional prestige, international recruitment and other interests that are seen to be constitutive of neoliberal higher education.

As the final contractual arrangements were falling into place, preparations were made to initially equip 148 teaching spaces with lecture recording capability. A considerable

challenge facing Kris Greene and other learning technologists was the need to install and test each unit within the narrow window of the four-month summer teaching break. This was further complicated by an existing arrangement where, as part of the University's strategic commitment to making a cultural contribution to Ancient City (described above), many of the identified teaching spaces were occupied by an arts organisation for much of this period. Where theatre and comedy performances brought visitors, publicity, revenue and cultural prestige to the University, according to Kris Greene it also limited opportunities for staff to rehearse with Review before the curtains opened on the new semester. This apparent conflict of interest needs to be considered against the backdrop of neoliberal higher education where the physical space of the university is a commodity that can be used to generate income. But it is also attributable to the wider function of the academy beyond issues of teaching, learning and research. In Chapter 4 I described how classrooms, cafés and corridors supported a range of spatial identities. In this example, the campus itself was at once a commercial, cultural and civic space, alongside any pedagogic work being undertaken amid the wandering troupes of performers and the applause of their audiences. Therefore on those occasions where Review made a lacklustre debut at the beginning of the autumn semester, this could have been put down to technical teething problems, although from a sociomaterial perspective, was also attributable to an assemblage of financial, political, cultural and strategic actors.

Algorithms, ads and the attention economy

From my regular seat in the back row of the lecture theatre I was well placed to observe and document the digital resources and rituals that helped to characterise the American History class. As I discussed in Chapter 4, this included the way that power relations were enacted through the amplification of the tutor's voice, alongside the role of digitally-mediated presentation content. Further insights were offered by the glowing banks of laptop screens in my line of sight, enabling me to watch how students followed the progress of the War of Independence and the Wall Street Crash. I have also touched on the way that splashes of colour disrupted the white-grey palette of the word processing page, exposing the instances where students followed social and domestic pursuits over stories of equality and emancipation. I want now to consider what these moments can tell us about the commercialisation of learning space.

Early in my field work I observed a student who, to judge by her posture and the way her gaze shifted between laptop and lecturer, was closely following that afternoon's lecture on slavery and servitude in colonial America. The content of her screen told a different story, however, as I watched her scroll through pages of clothing accessories on eBay. On a different occasion I became aware that the England cricket team were in action as I observed two students watching a match unfold via a live stream. As the image below demonstrates, on other occasions students were physically situated in the lecture but also present in an alternative networked space as they checked Facebook status and fashion lines, messaged friends and watched media clips. This is what Graetz, in his study of the psychology of learning environments, refers to as the 'dark side to the presence of personal, networked devices in class' (2006: 6.3), even if he acknowledges that there is nothing new in students following non-academic pursuits in class. Daydreaming and doodling are considerably different, I want to suggest, from some of the on-screen pursuits I observed in class. The networked device allows for covert conversation but more profoundly enables the student to be virtually present in a setting beyond the classroom. More relevant to the subject of this chapter, though, is that when the student's concentration switched between WhatsApp and what the lecturer was saying, her attention became a commodity in itself.

Networked pursuits in the history lecture

The commodification of the student's gaze described here fits neatly with the concept of the attention economy. More commonly associated with the discourse around business and technology, the attention economy has rarely been used to interrogate educational contexts. I want to suggest, though, that it can usefully contribute towards my discussion of the neoliberalisation and commodification of learning space. As set out by Crogan and Kinsley (2012), the attention economy sits comfortably alongside sociomaterial approaches to research through the way that it acknowledges the interweaving of a range of human, technological, financial and other material interests:

> Understanding processes of commodification, regulation and subjectivation of and through capacities for attention requires that we explicitly conceptualise the relation between bodies, cognition, economy and culture.
> (Crogan and Kinsley 2012: 2)

Applied to the learning spaces context, the attention economy recognises that the student's gaze is a resource over which commercial interests compete. The connectivity of the classroom, enabled through Ancient City University's investment in eduroam and its own wifi service, placed the lecturer in competition with celebrity gossip and the latest batsman to throw away his wicket. In this way the classroom became a kind of market place that situated scholarship up against online socially-networked interaction, made possible through data that permeated the physical perimeter of the lecture theatre.

The attention economy conflicts with the trope that celebrates the modern student's talent for multi-tasking, argued to have been acquired through years of immersion in digital environments (for a review of the literature around student multi-tasking see Alkahtani 2016). On the contrary, in his work around the psychology of learning spaces, Graetz (2006) argues that learning attention foregrounds a single stimulus at a particular time. The inability to adequately attend to a range of tasks in the classroom is also shown in research by Wood et al. (2012) where the opportunity to access networked spaces including Facebook was connected to lower levels of engagement with teaching content. Bowman et al. reached a similar conclusion as they pointed towards the detrimental impact upon academic reading of students who simultaneously had access to instant

messaging services (2010). During interview conversation around the practices of students in his American History lectures, Neil Jardine referred to the modern learner's ability to multi-task in class: this is a view that is contradicted by the above-mentioned studies and other research within cognitive psychology. The student I observed browsing for accessories would not, from Graetz's perspective, be able to evenly allocate her attention between eBay and the lecturer's discussion of whether all men are created equal. Instead, the networked connectivity of the classroom facilitates what Crogan & Kinsley describe as the 'economisation of cognitive capacities' and the competition for clickthroughs and eyeballs (2012:1). The inability of the student to adequately attend to more than one stimulus in a single moment attaches a value to her attention, as her key strokes and gaze become a potential source of revenue.

Evidence of the attention economy was not limited to the history lecture. In Chapter 4 I reproduced a screenshot of Yvonne Fisher's browser activity to demonstrate how she performed a range of social and domestic activities while seated at her desk in the design studio. I now want to consider what an equivalent image provided by Debbie Harris can tell us about the commodification of her screen-focused interest.

Website	Address
Last Visited Today	41 items
Historyspaces - JAMES LAMB-DIGITAL EDUCATION	http://www.james858499.net/historyspaces.html
Facebook	https://www.facebook.com/
in lew definition - Google Search	https://www.google.com/s...g#q=in+lew+definition&*
leugh definition - Google Search	https://www.google.com/s...IDg#q=leugh+definition&*
lew definition - Google Search	https://www.google.co.uk/...IDg#q=leugh+definition&*
laugh definition - Google Search	https://www.google.co.uk/...bs=leadership&gfe_rd=cr
lew definition - Google Search	https://www.google.co.uk/...ibMWOKsKq6Ltgetyo3IDg
lew - Google Search	https://www.google.co.uk/...NibMWJriMa6Ltgetyo3IDg
conservatism - Google Search	https://www.google.co.uk/...=conservatism&gfe_rd=cr
conservatism - Google Search	https://www.google.co.uk/...WJ-DNZTW8Ae9yaywAg
conservatism - Google Search	https://www.google.co.uk/...=conservatism&gfe_rd=cr
conservatism - Google Search	https://www.google.co.uk/...MWIbaD5TW8Ae9yaywAg
presented synonym - Google Search	https://www.google.com/s...onym&*&dobs=presented
presented synonym - Google Search	https://www.google.com/s...q=presented+synonym&*
presented synoyn - Google Search	https://www.google.co.uk/...q=presented+synonym&*
presented synoyn - Google Search	https://www.google.co.uk/...obs=presented&gfe_rd=cr
presented synoyn - Google Search	https://www.google.co.uk/...3MWOe5KJOE1gLvjrygAQ
William Scranton - Wikipedia	https://en.wikipedia.org/wiki/William_Scranton
scanton - Google Search	https://www.google.co.uk/...WJ7WLKeGgAaNv4_QDw
Civil Rights Act of 1964 - Wikipedia	https://en.wikipedia.org/wiki/Civil_Rights_Act_of_1964
George Wallace - Wikipedia	https://en.wikipedia.org/wiki/George_Wallace
partisan - Google Search	https://www.google.co.uk/...dobs=partisan&gfe_rd=cr
partisan - Google Search	https://www.google.co.uk/...MWLmCDqjA8geAiaPQBg
Flights to Munich - Google Flights	https://www.google.co.uk/

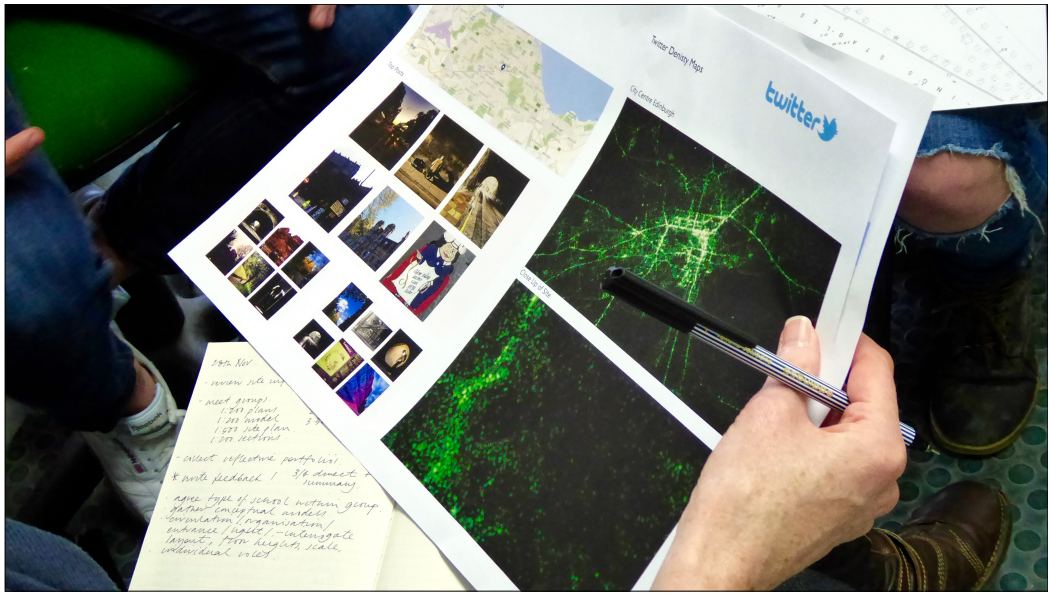
Debbie Harris' Internet activity

On this occasion I want to suggest that as Debbie Harris' interest shifted between Facebook, flights to Munich and searches for content to support her history essay, her attention became a commodity. It is worth noting that during the period that this activity covered, Debbie was also streaming a series of television shows in the corner of her screen, punctuated by adverts that sought to attract her interest and spending power.

I now want to move from the attention economy to discuss the commercial implications of algorithmic culture, as exposed during my field work. A feature of the Architectural Design course was that, mid-way through the second semester, the entire class assembled in a traditional theatre located in the basement of the Architecture School to participate in a pecha kucha exercise. Between flock-papered walls and beneath subdued lighting, each student delivered a rapid commentary and sequence of images setting out architectural work that had informed their formative thinking around the library project. As the first group of students cued up their slides, Olivia Yates and Victor Marsh told me that they hoped to see evidence that their students had gone beyond the earliest results of a Google image search as they had sought architectural inspiration. This was a topic I picked up during interview conversation, exposing a frustration among several tutors at the reluctance of many second year students to draw on the resources of the journal, architectural drawing and library. From Isobel Law's perspective, the image search represented a short-cut that skipped over the developmental stages that were crucial to the practice of architectural design. A visit to the library or examination of an architectural plan, she suggested, allowed for a detailed interrogation of the different stages of design and construction. The Google search, by contrast, offered a single snapshot of the completed building, or alternatively a computer-rendered imagining of how the completed building might look. The aggregated results generated by a rapid-fire Google search, it was explained, were unable to communicate the often complex, problematic and meandering path that, according to Olivia Yates, Victor Marsh and Isobel Law, was fundamental to the architect's craft.

In addition to this problematic skipping of the architectural backstory, the image search was also skewed by the complex workings of algorithms concealed within the search engine software. As Edwards and Carmichael set out in their discussion of the hidden

curriculum of semantic web technologies (2012), the digital resources upon which a considerable amount of educational activity depends are shaped by calculations and code beyond the gaze and understanding of the student or tutor. Put simply, an algorithm is a set of rules or processes that have been programmed into computer code. Particularly relevant to the discourse around neoliberalism and education is that the search engine, in common with many other platforms, is 'being controlled, not by educators, but by large multinational for-profit companies' thereby establishing a 'tension between their perceived pedagogical value, and the interests of profit' (Knox 2014: 53). Rather than being neutral, algorithms are subject to the pervading neoliberal climate (Williamson 2017) and 'have to be recognised as being ontogenetic, performative and contingent' (Kitchin, 2017: 21). What this means in the setting of the design studio is that when Robbie Stanton used Twitter density maps and Instagram to explore the usage of his designated library site, the results offered a version of reality that was shaped by biases programmed into a range of algorithms beneath the social media interface. It also goes some way to explaining the recurring pattern of images that appeared in the pecha kucha exercise, when they were shaped by popular results and search terms.



Robbie Stanton's site research using Instagram and Twitter

These examples extend an argument that Adam Wood makes in his work around architecture in education. Wood suggests that if martians arrived on earth and were to use

Google to search for an understanding of architecture, they would conclude that it comprised zig zag structures beneath the perpetual glare of the sun, although absent of any human life (2015). This skewed picture of architecture is explained by the Google business model which uses algorithms that recursively present results based upon the popularity of prior search terms. Applied to the practices I observed around the precedent study and the pecha kucha activity, it is interesting to consider how the concealed biases of the algorithm discreetly shaped the knowledge-making practices of learners and their conceptualisations of architecture. An architectural apprenticeship, of course, is much more extensive than the independent visual research described here, not least when students regularly presented their ideas to tutors and peers. And yet, when the students I worked with were much more inclined towards the convenience of searching through Google than exploring the physical space and materials of the library, it is difficult to escape the likelihood that commercially-oriented algorithms had shaped their compositional work and how they conceptualised and used their surroundings in the Architecture School.

The effects of the algorithm were also apparent when Matthew Redfearn turned to *YouTube* videos for tips, for instance as he cast models in concrete and created 3D drawings. The instructional content on these video tutorials was preceded by commercials and punctuated by pop-up banners. In order to generate revenue from advertisers, the YouTube platform makes use of algorithms that attempt to calculate the buying interests of the user, for instance based upon browser history and other profiling information it has generated. Matthew Redfearn's viewing habits and prior search terms will also have shaped the column of 'Up Next' content alongside each instructional video, tempting him to spend more time consuming YouTube content in a way that resembles the approach taken by supermarkets to tempt customers into further purchases at the cash till.

Turning attention to the American History course, with its tighter reign over the use of academic resources (see Chapter 4), there was less cause for students to visit YouTube or comparable spaces for the purposes of composition and research. The academic databases and learning platforms used by American History students were commercially-produced resources, but not designed to target students with marketing in the ways that

are prevalent across the open spaces of the web. The effects of commercialisation are therefore shown to vary depending upon disciplinary context, including conceptualisations of knowledge, pedagogy and the presence of digital resources. That said, when digital devices and networked content have enabled students to exercise high levels of control over where and how they engage in learning (Ellis et al. 2018; Dugdale 2009; Lomas & Oblinger 2006), there are openings for commercial interests irrespective of degree programme. This was seen for instance in the advertising sequences during television shows that sought to draw Debbie Harris' attention away from her History essay as she studied at home. And as we will see in the next chapter, the popularity among students of profit-oriented music streaming services like Spotify brought a commercial dynamic to any setting where a student plugged in her ear phones while studying.

The presence of advertising content also raises questions about the exposition of academic content. What, for instance, happens to the nature of knowledge when a journal article about President Reagan is juxtaposed with a two-for-one pizza promotion? How should universities and course designers feel about the overt presence of commercial enticements within screen-based learning spaces? Perhaps the answers lies through comparison with similar incursions into the physical environments of the campus, where the sponsorship of buildings is seen to undermine the integrity of the academic project. When Matthew Redfearn's view of a SketchUp tutorial on YouTube was partly obscured by an advertising banner, we might accept this as a minor by-product of learning that makes use of the profit-oriented spaces of the web. It would surely be deemed deeply inappropriate, though, if one of his tutors was to use lecture slides carrying adverts, or chose to disrupt tutorial discussion with short breaks for promotional content. Although this is a playful comparison, my point is that where students are encouraged, enabled or required to undertake learning in networked spaces that are subject to the interests of profit, tutors become complicit in the commercialisation of educational practice and the knowledge creation that is contingent on the interests of algorithms, advertising and the attention economy.

Conclusion: Commercial Space

From café ambience to algorithmic culture, lecture recording to league tables, this chapter has shown how digital technologies are complicit in the commodification and neoliberalisation of university learning spaces. Drawing on sociomateriality's openness to the full range of resources and interests that shape the performance of educational activity, I have cast a light on how the reconfiguration of campus learning spaces, the procurement and installation of technology, and the student use of profit-oriented online environments, introduced or extended a commercial dynamic to those settings where learning took place. The marketisation of higher education has promoted agendas of efficiency and performativity that have been heavily critiqued in the research literature. More subtle, however, is the way that digital technologies and data flows are contributing towards the commodification of the student's attention and those settings where she engages in screen-based learning. The student shares her identity as a scholar with that of a customer, while the classroom and screen are a hybrid of market and learning space, where degree programmes and knowledge are commodities. At the same time, I have challenged instrumentalist framings of the relationship between education and technology: as the different case studies have shown, the introduction of digital resources into the classroom and curriculum has consequences that cannot be predicted or realised in line with pre-determined pedagogic or strategic objectives. As I will discuss in Chapter 7, this has important implications for institutions, teachers, learning technologists, campus designers and its students.

Towards the beginning of this chapter I drew attention to some of the critiques of the commodification of higher education, including Davis' call for academic staff to stand in opposition to the language of neoliberalism (2005). As I will consider in the final chapter of this thesis, in light of the subtle yet profound ways that digital technologies bring a further commercial dynamic to learning spaces, it is interesting to consider the extent to which staff and their students are aware of, or able to resist, perpetuating and performing these processes in their everyday educational practices.

Chapter 6: Listening Space

Introduction

By tuning a critical ear to their surroundings, acoustemologists, sonic ethnographers and other sound scholars have sought to understand how settings as varied as the hospital ward (Rice 2003), place of worship (Rath 2012) and the suburban garden (Flitner 2014) have been shaped by the fluctuating presence and absence of sounds. In common with research around university learning spaces, there is an understanding that a physical setting cannot be adequately understood through its dimensions, layout or designated purpose. From the very beginning of my own field work it was apparent that music featured in the educational activities and spaces of higher education. My first visits to the Architecture School took place with the purpose of investigating student practices around assessment, but as I watched Sandy McFall and Yvonne Fisher build ideas across paper and screen, it became apparent that this was often undertaken while listening to music. I drew the same conclusion when looking over my photographs that depicted the surfaces of desks across the design studio: ear buds were pictured alongside the sketchbook, laptop and *Sharpie* marker, suggesting that the recognisable resources of the architectural designer might be extended to include those of sound-reproducing devices.

Traces of music in the design studio

In contrast, the lecture and tutorial settings of the American History course did not support opportunities for independently listening to music. Music *was* to be heard, though, as Andrew Marks welcomed students into class with a soundtrack attuned to the day's subject matter: James Carter And The Prisoners preceded a discussion of slavery and servitude; Scott Joplin's ragtime jazz set the scene for a journey into depression-era America.

> So oftentimes when students arrive in class I have a picture on the screen, and this picture on the screen right now is of New York around 1900. It's the Lower East Side, not far from Chinatown, I think. So it gives a sense of place. And oftentimes I've got sort of music playing in the background to accompany the image. And the intention, and I don't know whether this works or not but I do it because it's not much extra work for me do it, is to try to situate them in a particular time and place before I start talking. (Andrew Marks, American History Tutor).

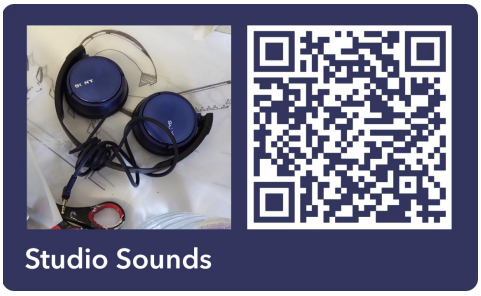
Having earlier described how the digital resources of PowerPoint and data projector heightened the visuality of learning spaces and practices within American History, it is interesting to consider how the use of different resources further broadened the orchestration of modes through which Andrew Marks attempted to teach and tell the story of depression-era America. This scene offers a neat fit between Jewitt et al.'s description of the way that the 'multimodal facilities of digital technologies enable image, sound and movement to enter the communicational landscape in new and significant ways', and the environment that American History students encountered as they entered the lecture to the rhythm of the *Maple Leaf Rag*. In the tutorial class meanwhile, students responded to Evelyn Hopkins' Vietnam War visual exercise (described in Chapter 4) with YouTube clips featuring Creedence Clearwater Revival's *Fortunate Son* and Crosby, Stills, Nash & Young's *Ohio*. Music was much more prevalent, though, in the personal learning spaces of American History students, emerging within the digital journaling exercise and when I shadowed Debbie Harris and Neville Smith.

In this chapter I am going use the listening practices of Sandy McFall, Debbie Harris and their fellow students to argue that through the reproduction of music, digital technologies contributed towards the negotiation of personalised learning spaces across and beyond the campus. To do this I will draw on the full range of data generated during my research,

combining audio and photographic data alongside excerpts taken from conversation with students. In some cases these discussions took place around the creation of the collaborative playlists introduced in Chapter 3, offering insights into the relationship between music, learning and space. In the pages that follow I am going to share episodes, practices and playlists which make clear that technologies of sound reproduction and resistance enabled students to shape the educational ambience of their surroundings, even if music was never experienced in isolation. Students retreated into personalised acoustic learning environments but remained moored to the wider materialities of the design studio, library and other settings. Music helped to configure those settings where educational activity took place, but could not singularly construct a learning space. As music was nearly always accessed via the Spotify streaming service, I am also going to argue that the negotiation of learning space was affected by the interests of profit and the sophisticated influence of the algorithm. Furthermore, while all of the students I worked with sought music to shape learning spaces and practices, this was done in a range of ways (and accompanied by a variety of musical genres). Before advancing any of these ideas, though, I want to spend some time discussing the reasons why students sought out music for learning in the design studio, library and other learning spaces.

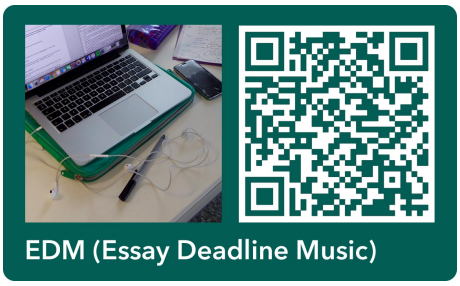
Music for learning

It seems appropriate that, in discussing the reasons students gave for seeking out music to support their learning, I should share some of what they listened to. In Chapter 3 I proposed the music playlist as an ethnographic artefact through the way that it helped to expose rituals around the performance of educational activities and spaces. Having already described the rationale and mechanics behind the creation of these artefacts, I want to briefly situate each playlist within the setting where it was conceived. I created the first playlist with students from the Architectural Design course, initially introducing the exercise during conversation in the studio, before pinning a notice to the ventilation column that split the tutorial bay. The playlist title, 'Studio Tracks', was my attempt to acknowledge where the nominated songs were recorded, but also the Architecture School setting where



students would spend long days and nights listening to the collected pieces of music. When some students offered a single track and others shared entire playlists, I was unable to include all of their suggestions, but instead made a point of including at least one nomination from each participant.

A different approach was required in the case of American History where the structure of the course meant that there were considerably fewer opportunities to informally encourage students to participate (particularly when the tutorial group assembled only once each week). Instead, I worked with the five students who had contributed to the journaling exercise, asking them for their suggestions and spending time discussing their music-listening practices during interview and on other occasions. This time I titled the playlist 'EDM: Essay Deadline Music', a play on the music genre that featured among the listening choices of students as they worked on the final stages of their coursework assignment. Dubtronica, R'n'B, Trip Hop. Music for drawing, music for reading, music for thinking. To varying degrees, and for a range of reasons, music was present in the learning practices and spaces of all ten students who were the focus of my research. The playlists testify to contrasting musical tastes, at least when it came to working through the complexity of the American Civil War or the aesthetics of library design. I will not, though, be adding to the body of research that has sought to establish whether a relationship exists between musical style and academic performance (for different perspectives on this subject see Dolegui (2013) Jäncke & Sandman (2010), de Groot 2006)). Instead, I want to share some of the reasons why, according to students themselves, they sought out music to support their learning.



As she commenced work on her American History essay in a café just beyond the Ancient City University campus, Heidi Green adjusted her ear buds and scrolled down her smartphone screen to a *Cheesy Hits!* Spotify playlist. If Billy Joel and Ricky Martin might not be an obvious source of inspiration for a discussion around the rise of feminism, Heidi explained that these and similar artists brought momentum to the formative stages of her

essay planning. As the assignment progressed her listening would migrate to movie soundtracks and 'something quite melancholic or slow' to help her to focus on the wording of her arguments. At around the same time that Heidi Green was drawing on the energy of Aqua and Atomic Kitten, Debbie Harris was writing her own essay while listening to the ambient electronica of Air and Múm on a different Spotify playlist. In other instances, the streamed playlist could sustain momentum when early enthusiasm for an assignment had waned. Endless hours trying to resolve design problems, according to Matthew Redfearn, brought a level of repetition that could be overcome by the Old School storytelling of Slick Rick. It became clear during conversation that hip hop was more than mere musical background for Matthew Redfearn, as he explained that it directly inspired his design thinking. This would manifest in the reflective portfolio he presented for assessment which described how his architectural approach had been informed by the music of Kanye West. At Matthew's request I helped him to produce a Mixcloud playlist that he submitted within the portfolio: a digitally-mediated musical take on the precedent work that is a central part of architectural design. John Brown was also of the view that music could counteract the repetition of some aspects of learning. To alleviate the tedium that could accompany the middle-stages of essay preparation, he described turning to a 'playlist of music your Dad listened to', particularly when working alone and at night:

> Sometimes it can get a bit monotonous if you're just typing and then all you hear is the sound of your laptop, just, and the keys going. If you had music it can kind of, you almost don't feel like you're doing work. So, sometimes it can be distracting if you're trying to think of something and there's music going. Or you know, you're typing and you just lose what you're saying. But it's kind of a, for me it's a kind of a main motivation and a kind of a mood booster. (John Brown, American History)

In this interview extract John Brown helpfully discourages us from assuming that music necessarily creates conditions that are conducive to learning. Instead, we get a sense of the subjective and complex nature of sound and listening as discussed in Chapter 2: John's playlist of adult-oriented rock could bring energy to his essay writing, but might equally divert him from the task in hand.

Compared with Matthew Redfearn, Neville Smith used music in what he described as a measured and selective way. This included mostly avoiding music with lyrical content which, like background conversation, tended to cloud his thinking. This helps to explain why, in an attempt to silence the everyday chatter and movement of human bodies through the Theology Library, Neville listened to classical music and occasionally Edith Piaf, the latter on account of his limited proficiency with the French language leaving him unable to 'tune in' with the chanteuse's narration. It seems doubtful that Neville Smith would have found the same contemplative and compositional space in the mix of funk and indie rock that soundtracked Robbie Stanton's long stints at the architect's desk. Of all the students I worked with, Robbie Stanton was most likely to be seen wearing headphones or poring over a playlist. For Robbie, music was a source of pleasure and productivity as he sought to match an artist or musical style to the design task facing him. That said, just as John Brown described how a soundtrack could quickly skip from help to hindrance, Robbie Stanton admitted that searching for songs to support his studying could become 'a form of procrastination' as he browsed through Spotify's vast catalogue: lost in music and distracted from his design work.

Spotify and the sociomateriality of the playlist

Although there was considerable variety in why and what they listened to, students music nearly always accessed music via the Spotify digital music service. In some instances students also accessed playlists via Mixcloud (Robbie Stanton) and YouTube (Matthew Redfearn, Neville Smith) or enjoyed listening to music while working in a public setting (Ella Ness, Heidi Green). An extended discussion of Spotify can be found in Sun's research around digital disruption in the music recording industry (2017) however I want to briefly introduce what is significant about this service in relation to the negotiation of learning space. Spotify markets itself on giving subscribers access to millions of songs via smartphone, tablet and similar digital devices. After registering, the Spotify user can access music through an online player or a dedicated app: as I will come on to discuss, this provided a mobility that was significant in enabling students to negotiate impromptu learning spaces, often beyond the classroom and campus. At the time that I was undertaking my field work Spotify offered a basic service where users could access music for free, however for students like Sandy McFall who preferred to listen without the

punctuation of adverts, a Premium Account was available for a monthly fee of £9.99. This option also held the promise of 'unlimited skips' and the ability to access any song across devices. Many of the advertised incentives of the Premium service were also available in the cheaper Student Account, favoured by Matthew Redfearn, among others.

> I have Spotify - the Student Account - which is really good. It's like a fiver a month for unlimited usage. And so you get to discover, you kind of, you have to initially start listening to music you like and then each week on the Monday you get a 'Discover' weekly playlist with basically new music Spotify has been like, 'you might like this', and you listen to that. That's really good. (Matthew Redfearn, Architectural Design)

Compared to accessing music via a download store or its high street equivalent, Spotify customers do not own the content they listen to but instead purchase access for the duration of their subscription period. Therefore where the mp3 was engineered to support portability, sharing and storage (Sterne 2006), Spotify in contrast is intentionally restrictive in usage and ownership. This was an arrangement that suited Ella Ness who, despite a fondness for her CD collection, had no reasonable way of bringing it with her when she left home for Ancient City University. The subscription that Ella Ness paid to Spotify did not give her ownership of the music by Charlie Winston and Ray Charles that accompanied her academic reading, but had the advantage of not taking up room in her luggage, the modest floorspace of her shared student flat, or the hard drive of her Chromebook. I want to suggest that this separation of music from a designated storage space provides students with a new level of influence over the selection and configuration of learning space.

Spotify's model of access and ownership has raised questions about the diminished royalties paid to the artists whose music fills its playlists (Krukowsi 2017), while a series of articles in the cultural and music industry media have warned of the detrimental impact that Spotify might have upon the creation and enjoyment of music itself (see for example Beaumont-Thomas & Snapes 2018). Assuming Ella Ness, Matthew Redfearn and their fellow students were aware of these concerns, their interest in Spotify rested in the way that it provided opportunities to craft bespoke and portable playlists to suit their learning practices and spaces.

> I've got what I call a 'music for work' playlist and it's got about 350 songs on it so far. So it's kind of just, hours! So I can shuffle it and know that the next song is always going to be something that I'm into. Or if I'm feeling like I want to like, focus in on something a little bit more, I know I have sections of the playlist that have this kind of music. Because if I'm in a certain mood I'll listen to a certain kind of music and I keep adding it and it informs pockets within the playlist. (Sandy McFall, Architectural Design)

Sandy McFall was typical in using Spotify's search functions to seek out music to suit his mood and surroundings in the moment. If the implication here is that can music be used in a singular way to construct spaces for learning, from a sociomaterial perspective the situation is considerably more complex. When Sandy McFall describes the way that Spotify 'informs pockets within the playlist' and Matthew Redfearn refers to the weekly selection of recommended music based upon his previous listening choices and habits, we begin to appreciate that the suggested power of choice exercised by the Spotify subscriber may not be all that it seems. Where Heidi Green would seek out movie soundtracks to create an ambience that suited her essay writing, and Matthew Redfearn chose hip hop to accompany and inspire his work with Autocad, their choices were discreetly influenced by the availability and absence of music with Spotify's catalogue. Going further, the prominence of particular artists and songs will have been shaped by sophisticated algorithms working beneath the Spotify interface. As Sandy McFall and Robbie Stanton explained, their playlists and listening practices developed iteratively as they skipped or selected songs suggested by Spotify. This in turn shaped subsequent recommendations and the priority given to particular artists and genres in the weekly Discovery playlists that Matthew Redfern described above. The point I am making here is these selections of music were not freely created: rather, the digital playlists students used to nurture particular kinds of learning spaces were shaped in subtle and sophisticated ways by the algorithmic selection, prominence and sequencing beneath the Spotify interface.

Without knowing the underlying assumptions programmed into these algorithms, when Spotify operates as a commercial venture, it is reasonable to assume that the creation of playlists is shaped with an eye to income generation. As Sun explains, Spotify was originally conceived with a view to the legitimate, but also profitable, sharing of music

content (2017). If we accept, as I have set out in Chapters 2 and 3, that sound contributes towards the performance of learning space and practices, then the presence of a profit-oriented bias in the algorithms that influence the content of Spotify's playlists, subtly imports a commercial dynamic to those spaces where students listen to music while engaged in educational activity. Therefore having already argued in the preceding chapter that networked technologies are deeply implicated in the commercialisation of university learning spaces, this is also shown to manifest through the digitally-mediated listening practices of students. Although Spotify advertises that it gives customers the power to choose music to suit any mood or occasion, from a sociomaterial perspective, we instead see the playlist as a form of shared curatorship between customer, code and commerce. As such, in arguing that learners actively use Spotify to select and arrange environments conducive to educational activity, I will also suggest that this is never a closed venture between student and streamed playlist, but is instead performed through a wider assemblage of human, technological and other material actors.

I am not suggesting, though, that Spotify has newly brought a commercial dynamic to the consumption of music. From Tin Pan Alley to the iTunes store, via the radio-friendly duration of the 7-inch record, the history of composing and distributing music has played out with a keen eye to profit. I want to argue, however, that the 'black boxed' workings of the algorithm (Edwards 2014; Kitchen 2017) represents an important departure from the commerce of the compact disc or the download. The invisible algorithmic processes concealed beneath the Spotify interface support a kind of opaque and commercially-oriented personalisation that is considerably more sophisticated than previous ways of promoting musical content. It is not simply that customers – or 'subscribers' to use Spotify's less overtly commercial terminology – are presented with music they might wish to consume, but that music is selected and sequenced based upon their prior practices, their profile and how this data sits in relation to the tastes and transactions of millions of other users. Considered in this way, the relations between technology, music and space are shown to be considerably more complex, sophisticated and commercially-oriented than scrolling down to one of Spotify's numerous studying playlists.

The musical arrangement of personal learning space

Having introduced some of ways that students felt music directly contributed towards their learning, I want to go further in asking how these listening practices were implicated in the negotiation of those settings where educational activity took place. In Chapter 4 I proposed that the audible character of the lecture theatre and design studio helped to expose how sound and technology were implicated in manifestations of power, pedagogy and epistemology. In the pages that follow I am going to turn attention to more individualised learning spaces and listening practices. As we have already seen, personal or individualised learning spaces are to be found in the busy setting of the design studio as well as the solitary domestic setting of the student's bedroom. A recurring theme of my conversations with students was that by reaching for their headphones and pressing play on a favoured playlist, they were able to establish their own space for learning in otherwise shared and often sonically-cluttered settings. This echoes findings from my earlier research (discussed in Chapter 3) which exposed how online learners sometimes looked to music as a way of establishing a form of distance or separation from their domestic and otherwise distracting surroundings (Gallagher, Lamb & Bayne 2016).

Particularly helpful in framing the discussion that follows is Flügge's work around personal sound space (2011) where she argues that individuals have the potential to influence their aural environment in what she calls 'spatial-acoustic self-determination'. Flügge presents the individual as actively involved in shaping her acoustic surroundings, rather than accepting or acting in response to a pre-existing sonic environment. In this way Flügge stands out from many of her contemporaries who have looked towards Schafer's concept of a common soundscape (1994), arguing instead that a single physical setting accommodates discrete individualised acoustic environments. This was particularly apparent when I spent time with Robbie Stanton and Edward Simpson, whose workspaces were situated side-by-side in the design studio.

Robbie Stanton's space in the design studio

On account of his desk sitting at a right angle to the corridor that ran the length of the studio (pictured here), Robbie Stanton was exposed to the sound generated by the constant movement of students and staff (conversation, laughter, the shuffling of feet across vinyl flooring) and more generally by audible traces of activity travelling unchecked from adjacent tutorial bays (project discussion, model-making and the multitude of sounds documented in the corresponding sound map in Chapter 4). The variety of sounds that impinged upon Robbie's workspace are captured in the following excerpt from my field notes:

> Sound travels through the central corridor of the studio. The movement of bodies. Laughter, sanding, tutorial discussion. Social chatter. The clatter of heavy material hitting the floor.
> *(Field note from the architectural design studio, semester 1)*

Perching at Edward Simpson's desk, the existence of a partition board and the bodily presence of his neighbouring student helped to absorb (although not silence) some of the sounds that readily impinged into Robbie Stanton's physical space, described above.

The possibility of a personalised acoustic environment was even more evident in Robbie Stanton's regular response to the rustling of paper, clatter of design boards and background chatter of fellow students. As he adjusted his noise cancelling headphones and opened his Bruno Mars playlist, Robbie Stanton enacted what Flügge describes as the potential for technologies of sound reproduction and repression to counter 'sonic trespass' into his learning space. This example is significant from a learning spaces perspective for two reasons. First, where the literature around campus spaces sometimes refers to the sonic character of a classroom or other setting (e.g. Jamieson 2003) we are reminded that sound is complex, subjective and difficult to control (Augoyard & Torgue 2005). Second, depending on the context, the students occupying these settings are not necessarily passive recipients of sound, but through digital technologies (for instance the combination of ear phones, playlist and music player) are able to exercise a degree of spatial-acoustic influence over their surroundings. This is not limited, however, to musically rearranging designated educational settings such as the design studio or library, but involves establishing spaces in a range of nominally social, domestic and transitory settings across and beyond the campus.

Mobile listening, mobile learning

In Chapter 4 I drew on work in mobile learning to make the case that digital technologies have helped students to enjoy a new degree of freedom over where and when they study. The combined proliferation of web-enabled devices, Internet connectivity and online content meant that Matthew Redfearn could create 3-D designs at his grandfather's dining table, and enabled Ella Ness to spread her essay-reading across a range of city centre cafés. In these and other examples, the significant contribution of digital technology to the negotiation of learning space was to be found in the way that students were able to remotely access and work with educational content in ad hoc or ostensibly domestic, social or transitory settings. I now want to argue that by using these same digital technologies to reproduce music, students were able to go further in rearranging the kitchen and cellar bar into environments that were attuned to educational activity.

Taking a seat in the student union or train carriage, Heidi Green and Robbie Stanton were able to plug into a vast library of music where they could select the genre that would help

to establish a suitable learning environment. Choosing the right playlist could help make the airline flight as conducive to essay writing as a stint in the library (John Brown) and could reduce the sense of isolation when home alone at the weekend, making slow progress on an architectural project (Edward Simpson). Assuming we accept that sound influences how we understand and experience our surroundings (as discussed in Chapter 2) the ease of accessing a never-ending choice of digitally-streamed music provided John Brown, Edward Simpson and other students with a new level of influence over the creation and configuration or personal spaces for learning. In this way, music and digital technology came together in the negotiation of learning space in a way that goes much deeper than simply checking email while commuting to the campus, or accessing the course readings without leaving the shared student flat. Even if John Brown and Edward Simpson did not always enjoy the level of freedom they imagined in selecting music, networked technologies and devices offered access to vast amounts of content through which they could attempt to engineer particular types of learning spaces.

This idea that portable and digitally-mediated music can help to transform a particular setting echoes a central idea of Bull's work around the culture of mobile listening, for instance when he describes how the iPod gives its user 'unprecedented power of control over their experience of time and space' (2005: 343). A feature of mobile listening, according to Bull, comes through the potential to establish an individualised narrative in a public environment. For Hosokawa this is explained by the way that the walkman device provides a personalised sonic experience that supports an alteration of the listener's relations with his surrounding space (2012). Reiterating once again that a learning space cannot be adequately defined through its physical qualities or the pedagogic activity that takes place within its environs, the combination of music and digital technology enables the student to influence her surroundings with the click of a play button. Although the term 'walkman' perhaps conjures up images of magnetic cassette technology, and the mp3 player has largely been subsumed into the multi-purpose smartphone, the transformational nature of mobile and individualised music-listening suggested by Bull and Hosokawa continues to resonate in the contemporary negotiation of learning spaces that I observed. When the original Sony Walkman was launched its portability was sometimes advertised through pictures of early-users joyfully combining the pleasures of

rollerskating and personalised music-listening. Travel forward four decades and equivalent music-listening technologies, through the unlimited range of content they offer, enable the listener not simply to take music wherever they go but to sonically rearrange those locations for the purpose of academic and other pursuits.

Ambience for classrooms

Bringing together Flügge's spatial-acoustic self-determination (2011), Bull's transformation of space into a personal narrative (2005) and the insights provided by students in my own research, it is clear that music is not merely the background accompaniment to educational activity, but helps to shape those settings where learning takes place (and from there, the practices that are performed in those same settings). I want, then, to think about the ways that students used the combination of streamed playlist and earphones to nurture particular types of educational ambiences to support their learning. Although 'ambience' is a term that is also found within the vocabulary of sound recording and music, I am interested in its wider usage as referring to the atmosphere or character of a particular setting. For Robbie Stanton, creating an ambience for learning sometimes involved importing a higher tempo than was present in his wider surroundings. This was evident in the contrast between the energetic and sometimes frantic rhythm of the indie rock and dance music he contributed to the collaborative playlist exercise (*Sometimes* by James; *Make Luv* by Oliver Cheatham), compared with the sedate settings of the train carriage, student bedroom and other photographed locations that featured in the postcards he submitted within the digital journaling exercise. As Robbie explained to me during interview, his choice of music was sometimes an attempt to raise the tempo of his work, but also to enliven his surroundings. It was a similar story for Debbie Harris who told me that she searched Spotify for playlists of 'machine noise' as a way of importing rhythm to her audible environment while trying to make progress on her history essay.

There was also a temporal dimension to the way that music helped to nurture a particular ambience for learning. As afternoon segued into evening, a preferred playlist or genre could be conducive to nocturnal study. When the reflective portfolio deadline demanded a night-shift at the keyboard, Sandy McFall scrolled down from Electric Youth to Ennio Morricone as he chose music to reflect that he 'was beginning to tire but still wanted to

continue to work'. In contrast, John Brown would defy falling darkness and fatigue with the uplifting exuberance of Freddie Mercury and other adult-oriented rock within his Mood Boosters Spotify playlist. Putting aside the contrasting musical tastes of Sandy McFall and John Brown, their approaches provide an alternative way of thinking about the negotiation of university learning spaces. A recurring theme in the contemporary discussion around university learning space is a move towards greater flexibility. As discussed in Chapter 2, this is reflected in the creation of classrooms that can be rapidly rearranged to support different pedagogic approaches (Goodyear et al. 2018) and in the way that digital technologies increasingly enable educational activity to take place beyond the classroom (Nordquist & Laing 2015; Randall 2015). The late-night listening tales of Sandy McFall and John Brown instead suggest a temporal fluidity to learning space. Or to put it another way, the furniture can remain static and the student sedentary, yet the ambience of the learning space - its character and propensity towards positive writing and sketching - is reconfigured through changing patterns of music, technology and time.

Where digitally streamed playlists were seen to nurture a personalised ambience-for-learning, an alternative approach was sometimes favoured by Ella Ness and Heidi Green. Alongside their use of Spotify, both students drew on the atmosphere of the jazz bar when preparing a coursework assignment. Rather than importing a particular sonic ambience into their learning spaces, Ella Ness and Heidi Green would instead seek those settings where they expected to find a musical soundtrack and accompanying atmosphere that would bring rhythm to their essay writing. In this way, they sought to respond to a pre-existing ambience rather than trying to more actively control their audible surroundings. From the 'acoustic perfume' of muzak (Murray Schafer 1994: 98) that tempts shoppers to browse and buy, to the phonograph records played on the production line to discourage factory girls from daydreaming about the 'sentimental and the sexual' (Bijsterveld 2015: 156), music has been used to establish a particular ambience and thereby engender particular behaviours. It would be going a little far to suggest that this body of research has now been extended to suggest a relationship between Charlie Parker and undergraduate writing around prohibition-era America, even if Ella Ness and Heidi Green sought out such music to improve the quality of their composition and academic performance. My point, though, is that in common with the range of attitudes and

approaches students demonstrated towards educational spaces and practices (as discussed in Chapter 4), the relationship between music, location and learning is articulated in a variety of different ways.

The listening practices described in this section expose a hitherto unconsidered flexibility around the contemporary learning spaces of higher education. Where I have previously argued that music can be used to create private learning spaces within shared domestic settings (Gallagher, Lamb & Bayne 2016), in fact students go considerably further by exploiting the accessibility of Spotify, combined with the vast amount of content it makes available, to actively negotiate the ambience of their surroundings in a range of ways. Much has been made of the way that networked technologies have provided students with unparalleled levels of freedom over where and when they study (Carvalho et al. 2016; Temple 2008). I want to suggest that the ability to sonically arrange the ambience of a learning space represents a different kind of flexibility and choice, albeit exercised in conjunction with other human and material interests. The flexibility of learning space was seen in the occasions that Debbie Harris helped rearrange classroom furniture to support group work, the moments she logged into the university portal while sipping tea on her couch, but also when she seamlessly shuffled between electronica and experimental pop while drafting her history essay. In this sense, the combined technologies of the music playing device, Spotify app and Internet connection provided Debbie Harris and other students with a particular power in the selection and configuration of personalised acoustic learning environments. This is not to say that students used sound to exercise complete control over their surroundings, but instead that music provided an alternative form of agency within the wider assemblage of social and material interests implicated in the performance of any setting where writing, drawing and thinking had its own soundtrack.

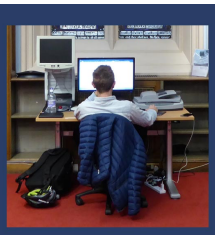
Solitude and sonic repression

Where the preceding examples suggested that digitally-mediated music helped to positively engender an ambience for learning, it was also a way of more practically attempting to mute the sounds and actions that prevented students from making progress on their architectural plans and American History essays. The clearest example of this was

provided by Neville Smith who used music as a way of attempting to silence the movement of people and objects in the Theology Library:

> You can kind of turn the volume up and you can't hear anything outside your head, basically. And you're in your own little world, yeah.
> (Matthew Redfearn, Architectural Design)

As Ceraso argues in her work around sound in multimodal composition, the combination of playlist, headphones and iPod enables listeners to disappear from unfavourable surroundings and to 'customise their soundscape to match their moods and desires' (2018a: 87). In Neville Smith's case this involved listening to a playlist of Chopin's concertos and chamber music in order to tune-out from the presence of fellow students as he composed his thoughts around the Hofstadter consensus and American historiography. There is a symmetry between Neville's use of music to create a space free of distraction and Bull's description of the way that the privatised, mediated and sound reproducing qualities of the iPod enable users to create environments that are 'intimate, manageable and aestheticised' (p 347), while 'transforming space and time into their own personalised narrative' (p 351). It is also interesting that the types of sound that Neville sought to escape do not evoke the unpleasant or oppressive sonic material that we would immediately associate with noise (as discussed in Chapter 2). This is reflected in the field recordings I made while shadowing Neville for a day as he worked in and around the Theology Library. Although a range of sounds were audible across the course of the day, this was certainly the quietest corner of the campus I visited during my fieldwork, other perhaps than when the design studio emptied after the final projects had been laid out for assessment. The hushed atmosphere of this setting, Neville acknowledged, helped to explain his presence when other libraries were situated closer to home and the History Department. As a side note, although it is beyond the interests of the research presented here, it is difficult to ignore the apparent harmony between the esoteric environs of the Theology Library and Chopin's 'Études' that accompanied Neville's essay composition.



Shadowing Neville Smith

The range and volume of sounds that we can hear in the video above were of nothing compared to the buzzing soundtrack of the design studio that prompted Robbie Stanton to retreat into an individualised world of music. Drawing again on Flügge's concept of spatial-acoustic self-determination, Robbie combined the technologies of sound repression (his noise-cancelling headphones) and sound reproduction (headphones, media playing software, laptop, streamed playlist) to negotiate a personal learning space. In these examples, music was evidently less about engendering a particular kind of atmosphere in itself than reducing disruptive noise, or limiting the effects of what Flügge refers to as 'sonic trespass' (2011). Beyond the sonic repression described here, Robbie Stanton explained that the act of wearing headphones also discouraged the attention of classmates who might otherwise have attempted to engage him in conversation. Therefore where his headphones reduced sonic trespass through their noise cancelling capacity, they also lessened disruption through their association with the need for studied concentration in the design studio.

Where personalised listening dissuaded fellow students from physically and sonically encroaching on Robbie Stanton's desk space, as Debbie Harris worked on her American History essay in the library, it was more a case of preventing her own attention from wandering away from the Watergate scandal and onto those individuals around her:

> I find I'm more likely to get distracted from seeing people moving, and watching people in the library, when it's that sort of like space with other people. So if you hear people shuffling papers you look up and you're like 'Oh, what are they doing?'. Whereas when you've got your earphones in you can't hear that and it is a focus thing at the same time as a distraction thing. (Debbie Harris, American History)

Therefore where Robbie Stanton saw the streamed playlist as a way of preventing disruptive sound from entering his work space, for Debbie Harris it was a device to stop her own attention from leaving the laptop, A4 refill pad and text books spread out across her preferred desk in the library. It was a similar story for Yvonne Fisher who told me that music's ability to aid her discipline was one of the main reasons she would reach for her ear buds in the design studio:

> So I listen to music when I'm in the studio. Mainly because it distracts me from the studio in front of me. Because that's where all my friends sit. So it means I don't go and sit chatting to them. But also it's nice to listen to after a while, when like all your hear is, like, people talking. It keeps you motivated. (Yvonne Fisher, Architectural Design)

For Debbie Harris and Yvonne Fisher there is a sense that by listening to music they were able to mute an internal voice that might divert their attention away from the laptop screen and onto the wider surroundings of their respective learning spaces. We need to be wary, however, of assuming that by connecting their earphone to the audio output jack, a student will necessarily achieve an environment of heightened concentration. Although Yvonne Fisher believed that music directed her attention towards her screen rather than her friends, in the absence of spoken conversation, dialogue would sometimes migrate to Facebook. This provided the incongruous spectacle of screen-mediated conversation between students seated within touching distance, and visible through gaps between the partition boards that nominally separated adjoining tutorial bays. Once again, we are reminded that sound, whether in the form of studio chatter or Yvonne Fisher's favoured 'chill playlist' on Spotify, is never experienced in isolation (McKee 2006; Gershon 2011; Pink 2011) but always alongside other a multitude of sensorial, spatial and other interests.

Moorings and the heterogeneity of music-listening

When Matthew Redfearn described the relationship between music and learning as entering his 'own little world' (see above), he captured what several of his fellow students felt about the potential of the personalised music-listening experience to create a space that was distinct from their physical surroundings. This is what Bull would describe as the creation of an 'auditory bubble' (Bull 2005: 344), where the listener uses music to create and manage a space that is simultaneously personal and in-tune with his or her desires at that particular moment. Along with Flügge's discussion of the personal sound spaces that emerge through technologies of sonic reproduction and repression, the auditory bubble is a useful way of explaining how digital resources and human interests are brought together in concert around the performance of educational spaces and practices. Nevertheless, although music helps the student to renegotiate her relations with a particular physical environment (Hosakawa 2012), it does not represent a complete

withdrawal from the wider human and material influences of the computer lab or café as she crafts an essay or architectural plan.

When Robbie Stanton retreated into a sonic-world of funk and soul to escape the distracting conversation and clatter of the design studio, it did not address the lack of natural light, alter the comfort of his chair, or prevent human bodies and the smell of food from travelling through the central corridor and encroaching into the environs of his desk space. Meanwhile the essay writing that John Brown undertook seated in an aeroplane might have been enhanced by his personalised in-flight musical entertainment, but was still subject to the visible attentions of cabin crew, the perfumed presence of fellow passengers, the quality of recycled air, and so on. Therefore where Matthew Redfearn and other students suggested that music helped them to establish a learning space that was distinct from their surroundings, this is a power beyond even the perfect playlist and most sophisticated noise-cancelling headphones. If digitally-mediated music helped students to cognitively float away to a place of calm and concentration, they remained moored to the wider materialities of the classroom and cabin. At different times the idea of moorings has been used within digital education research as a way of acknowledging the new mobilities and geographies that are made possible by networked technologies and learning (see in particular Bayne et al. 2013; Edwards et al. 2011). For the purpose of my thinking around space and sound, however, I have found moorings to be a useful way of acknowledging that while digitally-mediated music provided students with a new level of influence in the selection and configuration of spaces for learning, the streamed playlist is always experienced in conjunction with a wider range of actors that coalesce in the negotiation of those settings where educational activity takes place.

As well as being cautious not to over-estimate the power of the playlist in establishing environments that are conducive to learning, I want to draw this chapter to a close by reiterating that we should be wary of assuming that students are united in the way they use music. Of all the Architecture students I worked with, Edward Simpson was the individual most inclined to working with his fellow students, and

least likely to be seen wearing headphones. In contrast to Robbie Stanton and Yvonne Fisher who escaped conversation by putting their ear buds in, Edward Simpson told me that he thrived on the collaborative and conversational nature of his surroundings. This manifested in a different way beyond the studio. The postcards Edward submitted within the digital journaling exercise, and the conversation it provoked during interview, reflect how he would seek out music at the weekend in order to reduce feelings of isolation.

> Like, cos I live alone. So it's kind of nice having music around. Yeah. So its kind of just quite like background noise to work with. Like I don't actually mind what type of music is going on. As long as it's not hard rock or something like that. Like, nothing too extreme then I'm normally fine, so. Yeah, that's just kind of background music going on to make me feel less like isolated, I guess. (Edward Simpson, Architectural Design)

The contrasting music-listening practices of Edward Simpson and Robbie Stanton are instructive for a number of reasons. First, the streamed playlist was seen to provide solitude (Robbie Stanton) but could equally generate a social ambience that worked as a sonic proxy for the convivial atmosphere of the design studio (Edward Simpson). What we see here is the way that students differently use the technologies of sound reproduction and repression to negotiate personalised learning spaces. Second, when Robbie Stanton and Edward Simpson sat side-by-side in the design studio (as described towards the beginning of this chapter), their decisions over whether to put on a set of headphones (Robbie Stanton) or embrace the pre-existing audible environment (Edward Simpson) reiterate the subjective nature of listening (Cranny-Francis 2005; Bull 2012) and of noise (Flügge 2011; Gershon 2011) as discussed in Chapter 2.

The complex and contrasting approach to sound and music was also present as Neville Smith and Ella Ness worked on their American History essays. When Neville Smith would seek out what he presumed to be 'the quietest seat in the quietest library in the university' (and then play classical music to further exclude the presence of fellow students), Ella Ness was to be found in a busy jazz bar, tapping out her essay to the syncopation of her surroundings. There is a parallel here with Prior's (2014) research into the usage of iPods among undergraduate students. Prior found that, while many participants listened to music in a way that broadly enacted Bull's concept of the auditory

bubble (2005), a range of other practices existed across the group, once again challenging the notion that there is a single, unifying way of interacting with digital technology and with sound. Therefore when Temple (2007) makes the point that a single type of learning space will not meet the varying interests and needs of a heterogeneous body of students, we equally need to remind ourselves of the subjective nature of sound and listening practices. In his discussion of the architecture of university buildings, Neuman 2013 calls for greater attention to the way that sound contributes towards to an environment that is conducive to educational activity: this would seem to be a considerable challenge, however, when anything from background chatter to Clean Bandit are actively sought out by students as they negotiate spaces for learning.

Conclusion: Listening Space

From engendering an ambience that is conducive to learning, to erecting a wall of sound that counteracts the conversation of fellow students, music and digital technology coalesce in the negotiation of learning space. Where researchers have more-often sought to establish a connection between musical genre and academic performance, the interest of this chapter has been in the relationship between music and those settings where educational activity takes place. In particular, I have looked to the ways that students used the Spotify streaming service, in conjunction with other digital technologies, to establish environments that supported the composition of history essays, architectural drawings and other work. Without suggesting there is anything new in students seeking out music to accompany or inspire their learning, Spotify and comparable music services have brought a new level of choice and portability to listening practices. At the swipe of a screen students are able to access a vast range of content, thereby influencing the selection and then the sonic rearrangement of spaces for learning. I have been careful, however, to avoid suggesting that the playlist is responsible in itself for the character of those settings where educational activity takes place. The multi-sensorial character of a learning space means that while Debbie Harris used music to achieve a heightened level of focus as she worked on her history essay in the university library, her experience of that setting was also shaped by ambient temperature dictated in another part of the building, shifting patterns of light pouring through windows that stretched from floor to ceiling, the physical comfort provided by seating and desk height, and even the smell and then taste

of the tangerines that seemed to sit perpetually alongside her pencil case, laptop and refill pad. My point here is that while students were clear that music helped them to negotiate particular learning ambiences, it was not all-powerful in doing so. Returning again to my discussion of the literature in Chapter 2, sound is always and inevitably experienced in juxtaposition with other semiotic material. In the case of Debbie Harris, Neville Smith and their fellow students, though, music could feature prominently in the multi-sensorial orchestration of a learning space.

From a sociomaterial perspective, a learning space exists through the performance of music, technology, the learner's disposition, the academic task in hand and the shifting presence and absence of a host of other human and material bodies. This includes the commercial prerogatives that are articulated within the Spotify algorithm and render the playlist an act of co-curation between learner, technology and profit. In Chapter 2 I suggested that two of the prominent themes in the contemporary discourse around campus design concern the creation of flexible learning spaces, alongside the distribution of educational activity beyond the classroom and campus. In this chapter I have proposed that digitally-mediated listening practices support an alternative flexibility as students use music to nurture a range of learning ambiences across academic, domestic, social and transitory settings. Music for accompaniment, music for solitude, music for the negotiation of learning space.

Chapter 7. Conclusion

Introduction

In their recent discussion of contemporary research around learning spaces, Goodyear et al. criticise the tendency of education researchers to shy away from actionable knowledge, preferring to add nuance to existing interpretation rather than offering something more concrete that might assist the work of architects (2018). One way of reading Goodyear et al.'s observation is to say that, while it is important to examine the contemporary renovation of higher education campuses, something is lost when that critique stops short of being able to offer practical value to the work of those responsible for constructing and configuring classrooms and other spaces. This is at the front of my mind as I look to conclude this thesis: where is the practicable knowledge in my own research? What follows, then, is an attempt to reiterate the critical and methodological contribution of the work presented here, but also to suggest how it might inform some of the decisions that teachers, educational technologists, estates staff and institutions make around learning spaces. The purpose of this concluding chapter, then, is to ask 'Where is the value in what we have heard and seen across the pages and playlists, maps and videos that make up this thesis?'

This concluding section begins by briefly revisiting the different settings we have explored across this thesis: the thinking, commercial and listening spaces that framed my discussion in Chapters 4, 5 and 6. In each case I will tease out what was most significant about the relationship between digital technology and the different environments where educational activity took place. From there I will move on to talk about the contribution that these arguments have made. This will be done first by highlighting how this thesis extends the existing body of literature around higher education learning spaces. Second, I will set out where I was able to take an innovative approach in the design and use of methods. Third, I will discuss the practicable value of my research. Once I have summarised my work and set out why it matters, I want to then acknowledge two questions that emerged from my research that would merit investigation in the future. Finally, I will bring this thesis to a close with a video that draws across my field recordings, photographs and interview conversations to represent the complex assemblage of social

and material interests that shaped the learning spaces of Ancient City University. This final video directly juxtaposes representations of learning spaces from the American History and Architectural Design courses, considered in relation to the different themes that emerged during my research.

Thinking Space, Commercial Space, Listening Space

In chapter 4 we made a lengthy excursion across the wide range of spaces associated with the American History and Architectural Design courses. At every stop the influence of digital technology was apparent. In the history classroom we became aware that the development of presentation software, combined with the proliferation of image-based content across the web and the installation of data projectors, had contributed towards a more visually-oriented learning environment. I remarked at that point, however, that subsequent digital technologies could in turn reduce the multimodal richness of these learning spaces as lecture streaming prompted concerns about image copyright. Turning our attention to what could be *heard* in the lecture theatre, we came to recognise how audio technologies helped to enact a particular epistemology and set of power dynamics. Charles Hart's authority, and the hierarchical nature of knowledge, were reasserted through the lapel mic and ceiling speakers that conveyed his voice to every corner of the classroom.

The influence of technology was also to be found as we exited the campus and visited a range of nominally domestic, social and transitory settings. Networked technologies supported impromptu opportunities for learning as students killed time on the train journey and between supermarket shifts. More significantly, the emergence of sophisticated design packages, in conjunction with evolving industry practice, meant that architecture students constructed models and manipulated images in settings where this would not have previously been possible. Digital technologies had rendered students less bound to the environs of the studio and yet, like their counterparts in American History, the physical space of the campus retained considerable practical, pedagogic and symbolic value. In these and other examples, digital technologies were seen to provide students with a new level of power in the selection and shaping of learning space,

although this was always performed in conjunction with a broader range of social and material agents.

What we also learned from these examples was the way that digital technologies had helped to blur the distinction between the educational spaces of the campus, the domestic setting of the student flat and the social environs of the café and student union. This was particularly obvious in the design studio and lecture theatre where the flow of data and presence of networked devices meant that these designated teaching environments accommodated a range of spatial identities. These were places to draft an architectural drawing or plan a birthday outing through Facebook; to follow the progress of a lecture or the live-streamed action of a cricket match. This suggested that students were able to challenge the assumed hierarchy of the classroom as they entered and established personalised spaces within the educational space of the classroom. As I will come on to discuss below, the way that digital technologies challenge the conceptual boundaries of the classroom, while influencing shifting patterns of power, carries important implications for teachers, educational technologists and learning space designers.

Having surveyed the range of different settings associated with the American History and Architectural Design courses, in Chapter 5 our attention turned to the ways that digital technologies contributed towards the commercialisation of these learning spaces. We began by spending time in the learning café where students stopped for coffee but also scanned course readings, sought feedback from tutors on essay plans and shared their thoughts on globalisation during group discussion. With power sockets, free wifi and plenty of flat surfaces suited to resting a laptop, these were spaces designed to support learning beyond the classroom. However, overseen by a commercial arm of the University, they also existed with the purpose of generating income. Within a neoliberal climate where institutions are situated in competition and increasingly expected to demonstrate financial independence, the learner is a student but also a customer. This was also apparent in the roll-out of a lecture recording system that, among other reasons, was introduced with a view to improving levels of student satisfaction. At Ancient City University and across the sector, the contentment of the student body was of considerable

strategic importance, tied up as it was with the institution's standing in a competitive market and the ability to attract future cohorts of learners and the considerable fee income they would bring. Investing in lecture recording and networked campus spaces provided ways of satisfying the expectations of existing and prospective student-customers.

In the example of lecture recording we got a sense of the way that the relationship between digital resources and learning space was performed through a complex assemblage of political, commercial, technological, financial and pedagogic agents. At the same time it became clear that introducing technologies into the classroom and other educational settings carried unanticipated consequences. This was to be found in the flickering screen-mediated activities of students in the lecture theatre and design studio. The university's investment in wifi coverage had enabled educational activity to more readily disperse beyond the classroom into the corridor, café and beyond. But it had also inadvertently provided new opportunities for students to follow non-academic pursuits during designated teaching time. Drawing on the concept of the attention economy, we saw how some students battled to maintain their focus on indentured servitude or site-specific architecture. The conflict being played out on screen offered a further example of the ways that technologies are complicit in the commercialisation of higher education. As Yvonne Fisher's interest was tempted away from timber framing to a takeaway dinner, and Debbie Harris' mind wandered from Watergate to a weekend break in Munich, we saw how the student's gaze was transformed into a commodity through the commercial interests of the social web.

The interests of commerce were also present in Chapter 6 as we tuned into the music listening practices of Yvonne Fisher, Debbie Fisher and their peers. When students plugged into the Spotify streaming service, their learning spaces and practices became subject to the profit-oriented algorithms that shaped the selection and sequencing of music that soundtracked their writing and drawing. Although there was considerable variety in what they listened to and why, all of the students who contributed to my research sought music to support educational activity. Music, nearly always accessed through streaming software and a corresponding networked device, was shown to be a

way of nurturing the ambience of a physical space in order to make it conducive to learning. To the range of conditions that are identified in the research as helping to construct effective learning spaces, we might now add the music of Freddie Mercury, Bruno Mars and Britney Spears. The technologies of sound reproduction and repression were also used to counteract the distracting conversation of surrounding students or other sonic material that might disrupt the composition of an essay or architectural plan. Meanwhile the portability of the playlist and smartphone meant that students were able to establish and configure impromptu learning spaces with the swipe of a screen. Music contributed towards the sonic rearrangement of space, helping to transform the train carriage, kitchen, dining room and a host of other environments into places of learning.

Critical and methodological contribution

The contemporary redesign of higher education campuses has contributed to a growing critical interest in those spaces where educational activity takes place. A popular theme within this work, as I have discussed at different points over the last three chapters, has concerned the desire for flexible learning spaces that are able to support a range of teaching approaches. In this thesis I have proposed a different kind of flexibility, where the presence of networked devices and the passage of data enables a single physical setting to simultaneously accommodate a range of spatial identities. In Chapter 5 I used a composite image to illustrate moments of domestic and social activity that took place amid the higher educational purpose of the history lecture. Flexibility can come through the rearrangement of furniture and partitioning screens, but is achieved in a more profound way through the oscillating screen-based attention of the student. This flexibility was also evident as the combination of streamed playlist and noise cancelling earphones enabled Robbie Stanton to retreat into an acoustic bubble where the transitory space of the train journey was also a space to move his reflective portfolio forward.

The second critical contribution of this thesis concerns the unseen agents that directed the learner's gaze away from academic matters and onto the more commercially-tinged pursuits to be found on Facebook, Whatsapp and other overtly social spaces of the web. The neoliberalisation of higher education has provoked a considerable amount of critique, particularly during the last decade as universities have responded to a climate of

competition and reduced government funding. In light of the vast sums of money that have been spent renovating the physical fabric of universities, there has been a surprising absence of research that has sought to explore the relationship between learning space and neoliberalism. By arguing that digital technologies are implicated in the commodification of learning space, I have made a contribution towards addressing this gap.

A different type of critical contribution has come through the considerable play that I have made around the critical value of the audible. For the most part, education research and studies around university learning spaces have been silent on the subject of sonic material. And yet, as we have seen and heard across this thesis, sound is more than the mere backdrop to educational activity but is instead deeply implicated in epistemology, pedagogy and power.

The critical attention to the sonic character of learning space has also enabled me to make an original **methodological contribution**. This was helped by looking to the emergent field of speculative research, with its emphasis of creativity and participatory methods. It was through the work of Michael (2016) and Ross (2017) that I came to see my long-standing interest in learner-created playlists as more than an experimental side project, and instead a way of generating ethnographic data and provoking discussion. Also valuable was my use of interactive sound maps that enabled me to situate sounds within corresponding parts of the lecture theatre and design studio. This initially helped as a form of transcription and later enabled me to convey the combined sonic, visual and spatial qualities of the dominant teaching spaces of the American History and Architectural Design courses. In each respect, a multimodal approach helped me to make sense of the generated data in ways that would not have been possible by using sounds or images or words in isolation.

A different contribution to methods came through the use of digital sociomaterial journaling that built on some of my earlier research, alongside that of Gourlay & Oliver (2016). During my discussion of the literature I noted that, despite the considerable strategic commitment to learning beyond the campus, studies of those settings where

educational activity takes place are rare. As I will come on to discuss, there is considerable value in research that seeks to better understand how students negotiate personalised learning spaces beyond the campus, work that can be supported by the use of digital sociomaterial journaling that has been so important to the arguments I have been able to present across this thesis.

The thesis presented here, where textual discussion has been punctuated by videos, interactive maps and playlists, has been an attempt to explore the representational possibilities of the digital form. In particular, I was guided by Kress' discussion around gains and losses within multimodal communication (2005), as I explored how my work could exploit the potentialities of technology to best suit the arguments I have wanted to make, and the audience I have sought to reach. During the course of my research I was grateful to receive feedback from Gunther Kress on some of my work: I hope I have done justice to his ideas. As already discussed in Chapter 1, the representational form of this thesis makes an original contribution to methodological work within the context of social and education research.

The reproduction of field recordings has been a conscious attempt to confront what Steven Feld described some time ago as the sub-standard attention to the presentation of sonic data (Feld & Brenneis 2004), a situation that persists through the language-centric publishing conventions within social science research. While scholars working in creative arts are considerably more practiced at conveying meaning through sound, within the predominantly occular-centric world of education and social research, this thesis is unusual in using sonic material to advance ideas. I wish though to acknowledge some of limitations concerning my use of sound, while at the same time setting out how I might develop my methodological work with the audible in the future. First of all, when the decision to foreground the use of sound emerged *during* my research (prompted by the shift from assessment to learning spaces, as explained in Chapter 3) rather than from the outset, I missed the opportunity to spend more time considering how the placement of the recording device will have influenced the data I was able to generate. In Chapter 3 I have acknowledged the disparity between the recording capabilities of my Zoom H1 and iPhone SE, including the considerable value of the unidirectional microphone on the

former. By considering sound from the very beginning of future research projects, I will not only be able to look to achieve more consistent use of a recording device, but also consider how its location within a particular setting has implications for the gathering of material and subsequent analysis that can be undertaken. Taking the example of the sound maps within this thesis, although they served the purpose of documenting the representative sounds I had experienced in the design studio and lecture theatre across the year, in future approaches I could consider from the outset how location and use of multiple recorders might provide wider and deeper insights into the prominence and movement of different sonic material. Going further, the use of binaural recording devices could support the generation of richer, three-dimensional sonic material, bringing value to analysis carried out beyond the setting in which data was generated.

Looking to the future, I will also be better placed to consider some of the challenges of working with sound, as experienced during my research. As discussed in Chapter 3, the number of field recordings generated during my research was considerably fewer than the several thousand photographs I took across and beyond the campus. I have rationalised this disparity by explaining that in some cases an individual piece of audio data had a duration of more than an hour, compared to the single moment in time that it is possible to document within a photograph. This does, however, surface the challenge of knowing when to hit *stop and save* on the audio recorder, compared to the structured-in split-second documentation of the camera shutter. What I have learned through experience is that while there is value in setting out to capture a particular fragment of sound, there is also a great deal to be learned by letting the recorder continue to run. Indeed, many of the sounds reproduced across this thesis are drawn from lengthier recordings where I did not set out to do anything other than make a record of the audible character of a learning space across the duration of a tutorial or lecture. The lesson here, then, is that audio also supports a more open and less instrumental approach to documentation, in order to allow for the unexpected and unseen sounds that can be so useful in helping us to understand educational spaces and practices.

On a more practical note, compared with the ability to rapidly scan an album of photographs or search for key words across a folder of field notes, the audio file does not

lend itself to such straightforward collation and review. Again, it was a product of recognising the relevance of sound *during* rather than at the beginning of my research that I did not invest the time collecting and coding field recordings in NVIVO or equivalent software. The experience of poring through hours of audio when compiling the videos within this thesis will in the future act as a sufficient prompt to draw on the opportunities that exist through software that supports the collation and analysis of multimedia.

Going further, accumulated experience combined with a longer lead-in time will enable me to think more deeply and widely about ways of analysing and representing sonic material within my research. This could include, for instance, the use of sonograms as a way of examining and then helping to explain the trajectory of sound across learning spaces. To offer a single example, looking back to Chapter 4 where I discussed how the technologies of microphone and ceiling speakers worked to amplify the History lecturer's voice and authority over that of his student audience, there would seem to be considerable scope in using sonograms to demonstrate whether and how this became manifest. Allied to this, there would seem to be exciting possibilities around juxtaposing sonograms generated in different learning spaces as a way of interrogating the epistemological and pedagogical assumptions that exist across programmes of study.

Practicable knowledge

Now that we have returned to the different physical and conceptual spaces this thesis has visited, and I have reiterated the critical and methodological contribution of this work, I want to consider how the central arguments of my research can inform the practice of a range of staff who are directly concerned with higher education learning spaces. As I will come on to explain, when I have acknowledged the existence of multiple realities (Law 2004), shaped by the particular assemblage of social and material actors in any educational context (Fenwick et al. 2011), this research does not present a list of recommendations concerning the physical design and configuration of learning spaces. An endeavour of that kind is better served by the dialogue between architects, educators and other stakeholders, as pointed towards by Goodyear et al. (2018) among others. Instead, taking each of my central arguments in turn, I want to propose a series of questions and ways of thinking that can be of value to teachers, learning technologists

and space designers as they conceptualise and work with educational environments. In each case, I am specifically interested in the way that learning spaces are affected by digital technologies.

> ***Argument***: *The presence and positioning of digital technologies within a learning space nurtures particular epistemologies and disciplinary power dynamics.*

Technology, as Clegg et al. (2003) argue, is never neutral. Therefore when institutional managers, educational technologists or estate staff take the decision to install or upgrade digital resources in the classroom or across the campus, it should be recognised that there will be consequences beyond any push for innovative teaching or improved student satisfaction that might have prompted their introduction. When digital resources are relational to a complex assemblage of resources, some of which exist beyond the institution's knowledge or control, the impact that technology has upon learning spaces and practices cannot be instrumentally reduced to a pre-determined educational purpose or set of strategic outcomes. Furthermore, shifting patterns of materiality mean that the impact of digital technology can be felt differently in the learning spaces of one discipline compared to another. While it is pragmatic and sometimes necessary at times to refer to 'the student body', what we have repeatedly seen across this thesis is that there is considerable heterogeneity around the experiences and interest of students including, but not limited to, the influence of their chosen degree programme. Therefore the actionable knowledge here is a call for staff involved in the acquisition and use of technologies to recognise that the influence of a digital resource is not limited to the impact upon pedagogy, for instance as it contributes to the way that power circulates and knowledge is conceptualised in the classroom and further afield.

> ***Argument***: *The conceptual boundaries of the classroom and campus are reconfigured by digital technologies and the flow of data: learning spaces are fluid, hybrid and emerge through the negotiation of a multitude of human and material resources.*

This thesis has helped to expose the complex assemblage of social and material agents that shape the spaces where educational activity takes place. Particularly interesting have been the glimpses that we gained into the learning spaces that students negotiated beyond the campus. As the learning spaces literature attests, the pedagogic and societal shift to the digital has provided students with a new level of flexibility and mobility over where they can access educational content and undertake learning. Although the physical fabric of the university retains considerable pedagogical, practical, strategic and symbolic interest, mobile technologies and online content have meant that students are less bound to the library, design studio and other spaces than was previously the case. Important work continues to take place in these settings, however we have seen that a wide variety of domestic, social and transitory spaces are found by students to be highly conducive to learning, often through the potentialities of digital technology. And yet we know comparatively little about those spaces where students undertake educational activity beyond the campus, or how this impacts upon their learning. The practicable knowledge here, then, is that institutions and education designers can benefit from a greater understanding of the ways that students negotiate learning spaces beyond the campus, often by drawing on networked technologies. How, for instance, would a better understanding of these settings inform course design and delivery, but also how we look to support and engage with students more generally?

There is a further piece of practicable knowledge associated to this central argument from my thesis. Networked technologies do not simply enable academic content to seamlessly flow into the nominally domestic and social spaces where students eat, drink and sleep. On the contrary, the presence of wifi and proliferation of mobile technologies means that content of a non-academic nature also follows a networked corridor into the classroom. As I noted in Chapter 5, there is nothing new in students finding sources of distraction when we might hope they are gainfully committed to the pursuit of knowledge. It is a different proposition, though, when the ease of accessing vast amounts of networked content enables a student to be physically present in the classroom while browsing fashion lines or watching live sport from a far corner of the globe. Therefore where the upgrading of campus wifi might seem an obvious way of improving access to email and online journals, it can simultaneously support the ease of accessing non-academic content during

teaching time. The practicable knowledge here is primarily for educational technologists and space designers and is that investment in classroom and campus technologies can have consequences that work in direct opposition to teaching and learning.

> ***Argument***: *Digital technologies contribute towards the neoliberalisation and commodification of learning spaces and the practices that are performed in those settings.*

Surveying the educational literature, there is a pervading sense that neoliberalism is something which is hierarchically imposed upon academic staff, for instance through the emphasis on demonstrating value, the introduction of impact measures and the implementation of strategies setting out technologies to be used around marking and feedback. When interview conversation with Charles Hart and Robert Stone turned to the subject of lecture recording, they expressed a frustration at the way that the system was being introduced without empathy for the nature of history teaching. There was a sense here of technologies being introduced to the classroom for reasons other than teaching and learning. Although the tutors from the American History course were either relaxed or resigned to accepting the introduction of lecture recording, the research literature (discussed in Chapter 3) has often taken a more critical view of the way that educational technologies contribute towards the commercialisation of educational spaces and practices. This has included Davies & Petersen's call for staff to reject the language of neoliberalism in order to avoid compromising the value of the academic project (2005). I want to suggest, however, that the commercialisation of higher education does not rest entirely in the hands of politicians or a kind of faceless university management that is sometimes portrayed in the literature. Instead, the decisions that individual teachers and educational technologists make around the choice and deployment of digital technologies can be complicit in the commercialisation of learning spaces and the commodification of education itself. In Chapter 5 we saw how Architectural Design students readily turned to Google, YouTube and other spaces of the web as they sought inspiration or helpful hints in order to advance their project work. When they did so, the content they accessed was shaped by the interests of profit, whether through the presentation of search results or the pop-up banners that punctuated their viewing of

content. If as teachers we are uncomfortable with the commercialisation of higher education, we might consider whether course design that encourages or necessitates students spending time in these spaces brings a further commercial dynamic to their learning spaces and practices. If we direct students to networked spaces beyond the institutional setting of the learning management system or the academic database, do we also become complicit in the neoliberalisation of higher education environments and endeavour, as their conceptual and compositional practices become contingent on the commercially-oriented configuration of code beneath the search engine? And if we acknowledge this to be the case, what might we do to encourage students to use these spaces knowingly?

Sociomateriality, mess and the knowledge claims of this thesis

This thesis has raised a number of important questions concerning the conceptualisation, construction and configuration of learning spaces. What it has not done, however, is to set out a series of guidelines or made claims to generalisability. Drawing again on Law's work around mess in social research (2004), our world is defined by complexity and multiple realities, undermining attempts of conventional social research to bring clarity and order to our surroundings. The arguments presented within this thesis were informed by a lengthy period of observation, alongside extended conversations with staff and students, hundreds of audio recordings, thousands of photographs and many pages of field notes and other documentation. This enabled me to explore in detail the learning spaces associated with two courses and particular groups of individuals over a chosen period of time. The knowledge generated through this field work enabled me to construct arguments and in turn suggest ways of thinking about the relationship between learning space and digital technology. It has not, though, uncovered a reality or set of recommendations that might be tidily transposed across contexts. As Law argues:

> There is no general world and there are no general rules. Instead there are only specific and enacted overlaps between provisionally congealed realities that have to be crafted in a way that responds to and produces particular versions of the good that can only travel so far. (2004: 155)

The practices and places that I heard, saw and discussed were contingent on the specific arrangement of social and material actors during that period of my fieldwork. As I have already acknowledged in Chapter 3, this will have included the particular data generating capabilities of my audio recorder and camera (and the underlying decisions programmed into their software), the personal interests of students and staff, institutional regulations, physical surroundings and other unseen opportunities and pressures of a political, commercial and pedagogic nature. We have to assume that if my research took place in a different setting or over a different period of time, the shifting patterns of materiality that shape educational practice (Fenwick et al. 2011) would have seen me differently observe, document and interpret the educational spaces and practices.

To offer an example of the contingent nature of my research, as my fieldwork was drawing to a close the finishing touches were being applied to a design studio that would become the new 'home' for Matthew Redfearn, Yvonne Fisher and their peers the following academic year. Richard Gates and other members of the teaching team suggested during interview that with high ceilings and natural light, pristine desks and the absence of partition boards, the new studio might engender a different type of learning space, with implications for the design work that would take place:

> Second year are moving to the art college this summer. In a couple of weeks we're getting a new space along there. Purpose-built, for us…And I've been trying to get across to the architect, 'I do not want an expensive flooring material because if my students put anything on it I'm going to get a memo saying, "Don't put anything on the floor". So rather than students worrying about what they're making, they'll be worrying about making a mess of the floor. And I'll be worried about policing them. So it'll be interesting to see if that happens. (Richard Gates, Architectural Design tutor)

That my observations were shaped by a particular set of subjectivities also became apparent in the advanced stages of writing-up my research. As I visited the library in the Architecture School to consult a text on campus design, I was happy although surprised to see Matthew Redfern and Yvonne Fisher, both now in their fourth year of study. I had been a regular visitor to the same library during my field work, normally to pull together my notes or when I had arrived early for classes or tutor meetings. Across all of those previous

occasions I only twice saw any of Isobel Law's tutorial group. And yet within a single visit, here were both Yvonne and Matthew, hard at work on another architectural design project. Although I enjoyed a short whispered conversation with each student, it was only after the event that I thought about the significance of their presence in the library. Within a couple of days they had each replied to an email I sent asking how they were now using the library.

> Last year I used the main library for the first time, but I still didnt spend much time there because most of my time was spent in the studio, so i'd write my essays on a night at home. Another reason is that most of us dont have a studio space this semester, I kind of do but the other subject im taking is On colour in architecture, which is also essay based and reading, so I don't find a studio space that productive for that kind of work. If people are working in there, its quite chatty and I never end up getting any work done. (Yvonne Fisher, Architectural Design)

Yvonne's reply is interesting in the way that it highlights how her use of the library was influenced by the nature of the courses she was studying which were not suited to the convivial atmosphere of the design studio. Meanwhile, where she and other students had previously described the studio as a 'second home', her lack of entitlement to a designated space seemed to make her less attached to that setting. Matthew Redfearn's email was similarly enlightening:

> So yeah, this term I have certainly spent the majority of my time working in the Art and Architecture library. I also used it a fair bit this time last year (1st Semester of my 3rd Year) working on architectural theory predominately. I think to be honest I have done this because my all my courses have been essay based especially given I have been writing my dissertation. Compared to the main library in [another part of the campus] I would say it feels a bit more relaxed maybe as its smaller and cosier. I would also suggest that I personally began investing myself in my work more in 3rd and 4th year so felt the library might offer a more conducive working environment. (Matthew Redfearn, Architectural Design)

Like Yvonne, Matthew was evidently finding the nature of fourth year pedagogy better suited to spending time in the quiet of the library. Also interesting, though, is the acknowledgement that his use of this learning space had also evolved in line with a more conscientious approach to his studies. Therefore where learning space is characterised by fluidity, so Matthew's relationship with the Architecture Library had changed on account of

his own shifting attitude towards learning. Both responses meanwhile expose how the shifting presence and prominence of different social and material agents differently shaped the performance of learning space and learning practices from one year to the next. This suggests a temporal influence over learning space that was not considered in my research, where the pedagogic conditions remained mostly unchanged for the duration of my field work. The wider point I am making here is that the value of my paradigmatic position is situated in the ability to construct arguments based upon the amount of attention I dedicated to particular settings over a particular period, but not to propose that what I heard and saw would be neatly replicated in different contexts.

The personalised learning spaces of staff

The research presented here benefited greatly from the opportunity to speak and spend time with Evelyn Simpson, Andrew Marks, Isobel Law and other tutors from the American History and Architectural Design courses. It is clear from the video content across this thesis, though, that I spent more time exploring the learning spaces and practices of their students. This emphasis is consistent with much of the research which, perhaps understandably, considers learning space against the needs of the learner. An exception is offered by Drew & Klopper (2014) who were instead concerned with teacher perceptions of their learning spaces, albeit limited to the environs of the university campus. It was while listening back to the recording of my interview with Neil Jardine that I began to question whether I might have gone further in exploring the learning spaces of staff. As conversation turned to Neil's preferred approach to essay marking, he explained that this had recently changed in light of a new policy within the History Department requiring staff to use Turnitin. Neil was broadly in favour of the move, particularly when on-screen marking gave him the flexibility to cast an eye over coursework assignments in a café or at home. Anxiety about losing printed assignments had previously discouraged him from doing so. In the case of Architectural Design, Isobel Law explained how an earlier decision requiring students to submit a digital version of the portfolio several days ahead of the designated marking day had meant that she and other colleagues were able to familiarise themselves with the work from the convenience of home or elsewhere. This was a valuable advantage when most of the team were also practising architects and therefore not necessarily based within close proximity of the design studio.

In Chapters 4 and 6 I suggested it was significant that networked technologies had enabled students to establish or configure learning spaces in ad hoc or nominally social or domestic settings beyond the campus. If we accept that setting can have an important influence over the educational activity that takes place (as discussed in my review of the literature in Chapter 2), there would be seem to be valuable work in research that investigates whether and how the societal and pedagogical shift to the digital is affecting the learning spaces and practices of university teachers. What could we learn, for instance, if Timothy Stone, Olivia Yates and their colleagues were to participate in the digital sociomaterial journaling exercise that revealed so much about the ways that their students negotiated personalised learning spaces beyond the campus?

The post-digital learning spaces of higher education

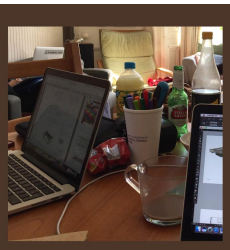
A further opportunity for research was suggested in the very final stages of writing this thesis as I listened back to my interviews for a final time. While my questioning sometimes sought to understand what was significant about the presence of technology within educational spaces and practices, for their part students seemed less aware of a distinction between digital and more traditional resources. It was also the case during my field work that students seemed matter-of-fact about having instant access to a vast database of music that could shape the educational ambience of their learning spaces, or the technologies that enabled them to craft visually sophisticated drawings and models across the screen. This would seem to align with the growing discussion that is taking place around the concept of the 'post-digital', discussed for instance by Jandric et al. (2018) and Feenberg (2019). The central assumption of post-digital thinking is that technologies that were once seen to be ground-breaking or revolutionary in terms of their impact upon education and society have, through familiarity, become part of the ordinary. Therefore where the corresponding stage of my own undergraduate career was characterised by the C90 cassette and Mac Classic, considerably more advanced technologies had long since become subsumed into the everyday surroundings of the students who were largely unmoved about the vast digitally-mediated music catalogue and compositional power at their fingertips.

When the critical discussion of the relationship between technology and education has often looked to the ways that digital resources have effected an abrupt shift in aspects of teaching, learning or literacy, a post-digital perspective instead sees the more gradual emergence of new practices. As Pepperell and Punt have argued, this usefully moves us beyond the notion of a digital revolution (2000), with the implication that technologies have ousted more conventional approaches to education. Rather, post-digital thought sees previous and emergent approaches coalescing to the point that we need no longer distinguish between new and old, analogue and digital. This does not undermine the importance of thinking deeply about the presence and influence of digital resources within learning spaces and practices, but instead provides a way of framing technology that is more attuned to the way it has become enmeshed and established within the pedagogic and physical fabric of the university. In light of the growing recognition within the learning spaces literature that we need to move beyond binaries associated with the classroom and campus, post-digital thinking might provide a nuanced way of conceptualising and researching educational settings, as well as better understanding how students understand and work within environments that are experienced both physically and digitally.

Exit

Towards the very beginning of this thesis I attempted to convey something of the character of Ancient City University through a short video comprising audio recordings and photographs generated in different corners of its campus. This was a way of introducing the setting where much of my fieldwork had taken place, while also establishing the tone for what would follow. Without suggesting that the orchestration of sights and sounds resembled the slick marketing materials used by universities to project institutional identity, it nevertheless offered a fairly conventional depiction of the University's physical space. The stone facade of the graduation hall, raked lines of the lecture theatre and the view from the library across the city helped to convey the University's tradition, status and situation. I want to close this thesis with a final video that offers an alternative representation of Ancient City University, drawing on what we have heard and seen across the last six chapters.

We have covered a considerable distance since the opening moments of this thesis, taking in a variety of settings where a range of educational activity took place. A considerable amount of time was spent searching for meaning through the social and material resources that helped to define the design studio and lecture theatre. From there we visited the library, print room, exhibition gallery and computer lab. We worked through ideas in the university's corridors and then paused for reflection in the campus café. But we also ventured much further afield. We shivered in the chilly air of the top floor student flat and savoured the subterranean ambience of the cellar bar. These settings, we found, were places for eating, socialising and also learning. Our excursion was extended aboard the train carriage and airline cabin, helpfully reminding us that learning spaces can be fluid rather than fixed. In every case, digital resources were implicated in the negotiation of these learning spaces, albeit always in conjunction with a multitude of historical, pedagogical, technological, political, commercial and other social and material agents. Our critical excursion concludes, then, with this final collection of field recordings and photographs which reflect the variety and complexity that characterise the learning spaces of higher education.



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Appendix 1. Introducing the digital journaling exercise on my research website

Capturing a coursework essay in Modern United States History

This page is intended for students participating in the *Modern United States History* course at the University of Edinburgh. To begin, thank you for offering to participate in this 'journalling exercise' in support of my research - I really appreciate your contribution. While the exercise should be quite straightforward, I thought it would be helpful to briefly outline what I am looking for you to do.

The purpose of this exercise is to help me understand the different resources, opportunities, constraints, pressures and influences that come together in the preparation of a coursework essay. To help me achieve this I would like you to:

1. **Take a photograph** of your 'learning space' on each occasion that you work on the essay. By learning space, I simply mean the place where you are working on the essay. It is entirely up to you to decide what to photograph. I am interested in all the different stages of your work on the essay whether that involves visiting the library, online research, note-taking, writing, editing and so on. Therefore whenever you spend time working on any aspect of the essay I would like you to take a photo (even if you always work in the same place). Don't worry about the quality of the photograph - I just want to get a sense of your different learning spaces.
2. **Make a short sound recording** of each of these spaces. This should ideally be around one minute in length and is intended to capture the ambient sounds of each learning space - I'm not looking for you to record a spoken commentary. You might make this recording on your mobile phone (for instance using the Voice Memos function or equivalent) or any other device that is convenient to you. As with the photographs, I am less concerned with the quality of the sound recording than what it might tell me about your different learning spaces as you work on the essay.

Keeping a record of your photos and sound recordings

In each instance that you capture your learning space I would like you to record the date and time, location (e.g. 'library', 'cafe', 'in my room' and so on) and a very short description of your activity at that point (e.g. 'reading', 'writing a first draft' - whatever description you think is best).

Sharing your data

I want to make to make this exercise as easy as possible for you therefore you can submit your gathered information in any of the following ways:

1. Using this online submission form
2. By e-mailing the information to me at j.i.lamb@sms.ed.ac.uk
3. Using a USB pen drive that I will provide you with

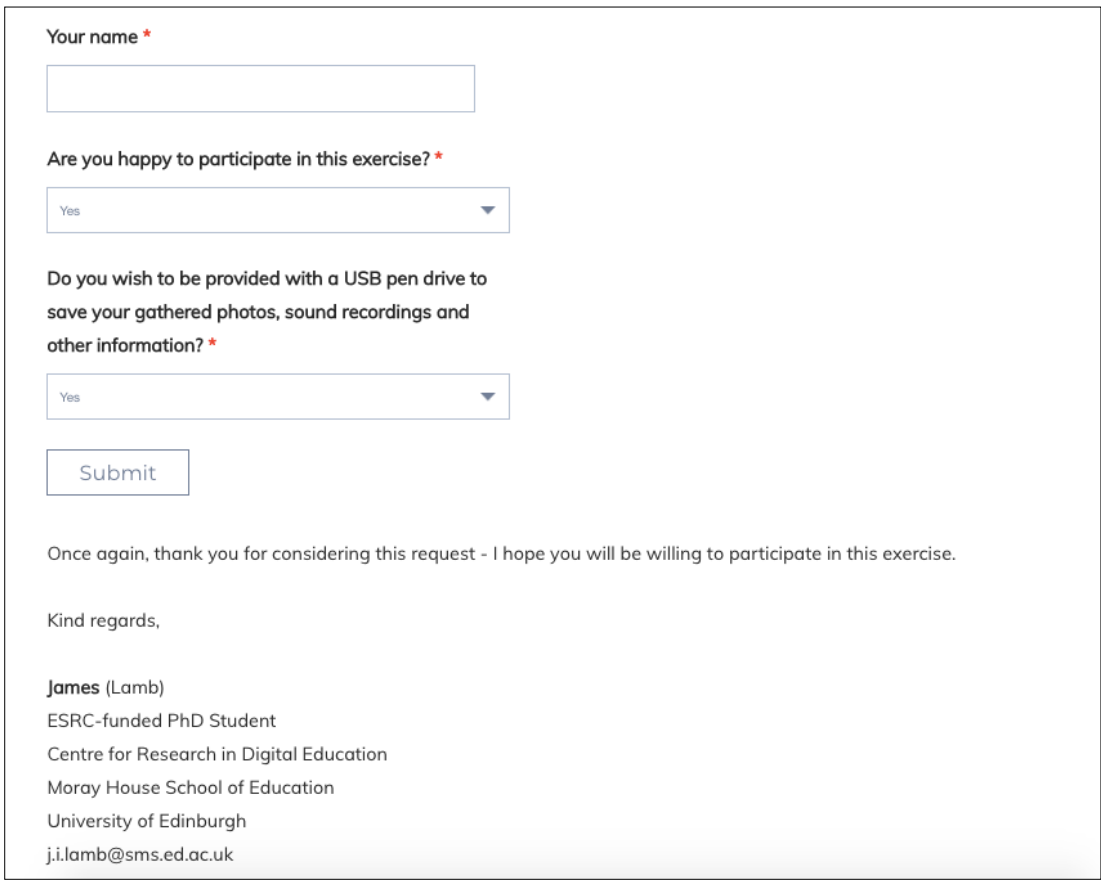
In gratitude for your cooperation

I have already mentioned how much I appreciate your contribution here therefore I would like to give you a £20 gift token (Blackwells or whatever you prefer) for agreeing to participate. I have designed this exercise in a way that I hope will cause as little disruption as possible to your studies, but at the same time your involvement could have a really positive effect on my research.

Confirming your willingness to contribute

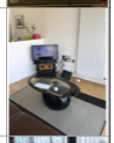
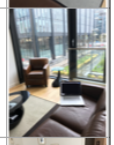
If you are willing to participate in my research as described above, please complete the short form below. If you have any questions, please don't hesitate to get in touch by e-mail at j.i.lamb@sms.ed.ac.uk or after one of Catherine Bateson's tutorials on Tuesday afternoon.

** Indicates required field*

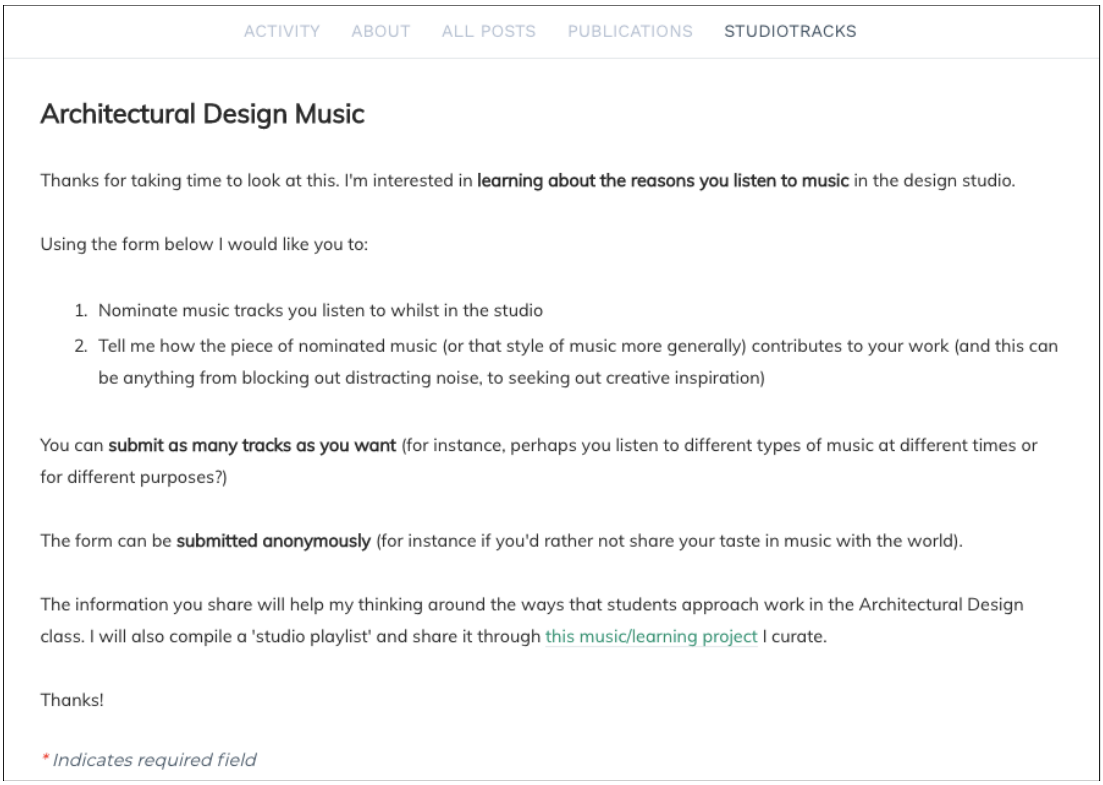

Your name *
Are you happy to participate in this exercise? *
Yes
Do you wish to be provided with a USB pen drive to save your gathered photos, sound recordings and other information? *
Yes
Submit
Once again, thank you for considering this request - I hope you will be willing to participate in this exercise.
Kind regards,
James (Lamb)
ESRC-funded PhD Student
Centre for Research in Digital Education
Moray House School of Education
University of Edinburgh
j.i.lamb@sms.ed.ac.uk

Appendix 2. Example of collated data from the digital journaling exercise

Sheet 1

	A	B	C	D	E	F
2	**Student**	**Photo**	**Sound clip**	**Activity**	**Timing**	**Photo**
3	**Robbie Stanton**	day_one.jpg	recording_1_lewis.m4a	I was working on a page in my reflective portfolio while coming home on the train.	8/05/17 8:36 PM	
4	**Robbie Stanton**	day_two.jpg	recording_2_lewis_.m4a	I was using autocad to create a site plan for my reflective portfolio	02/05/17 9:07 PM	
5	**Robbie Stanton**	day_three.jpg	recording_3_lewis.m4a	I was creating a roof plan for my building on autocad.	3/5/17 22:30	
6	**Robbie Stanton**	day_four.jpg	recording_4_lewis.m4a	I was working on the same drawing as the day before, just further developing my roof plan on autocad.	4/5/17 18:00	
7	**Robbie Stanton**	day_five.jpg	recording_5_lewis_.m4a	I was developing the background buildings for a section on autocad.	5/5/17 0:00	
8	**Robbie Stanton**	day_six.jpg	recording_6_lewis_.m4a	I was developing a section of my actual building using autocad late at night.	7/5/17 1:50	
9	**Robbie Stanton**	day_seven.jpg	recording_7_lewis_.m4a	I was creating a floor plan for the third floor of my library design using autocad.	7/5/17 20:22	
10	**Robbie Stanton**	day_eight.jpg	recording_8_lewis_.m4a	I was further developing my section of my building from the day before using autocad.	8/5/17 20:36	
11	**Edward Simpson**	img_4406.jpg	new_recording_7.m4a	Portfolio Proofreading	08/05/2017 12:00	
12	**Edward Simpson**	img_4399.jpg	new_recording_6.m4a	CAD drawings	10:30am 7/5/17	
	Edward	img_4397.jpg	new_recording_5.m4a	Portfolio	06/05/2017	

Appendix 3. Introducing the collaborative playlist exercise on my research website



ACTIVITY ABOUT ALL POSTS PUBLICATIONS STUDIOTRACKS

Architectural Design Music

Thanks for taking time to look at this. I'm interested in **learning about the reasons you listen to music** in the design studio.

Using the form below I would like you to:

1. Nominate music tracks you listen to whilst in the studio
2. Tell me how the piece of nominated music (or that style of music more generally) contributes to your work (and this can be anything from blocking out distracting noise, to seeking out creative inspiration)

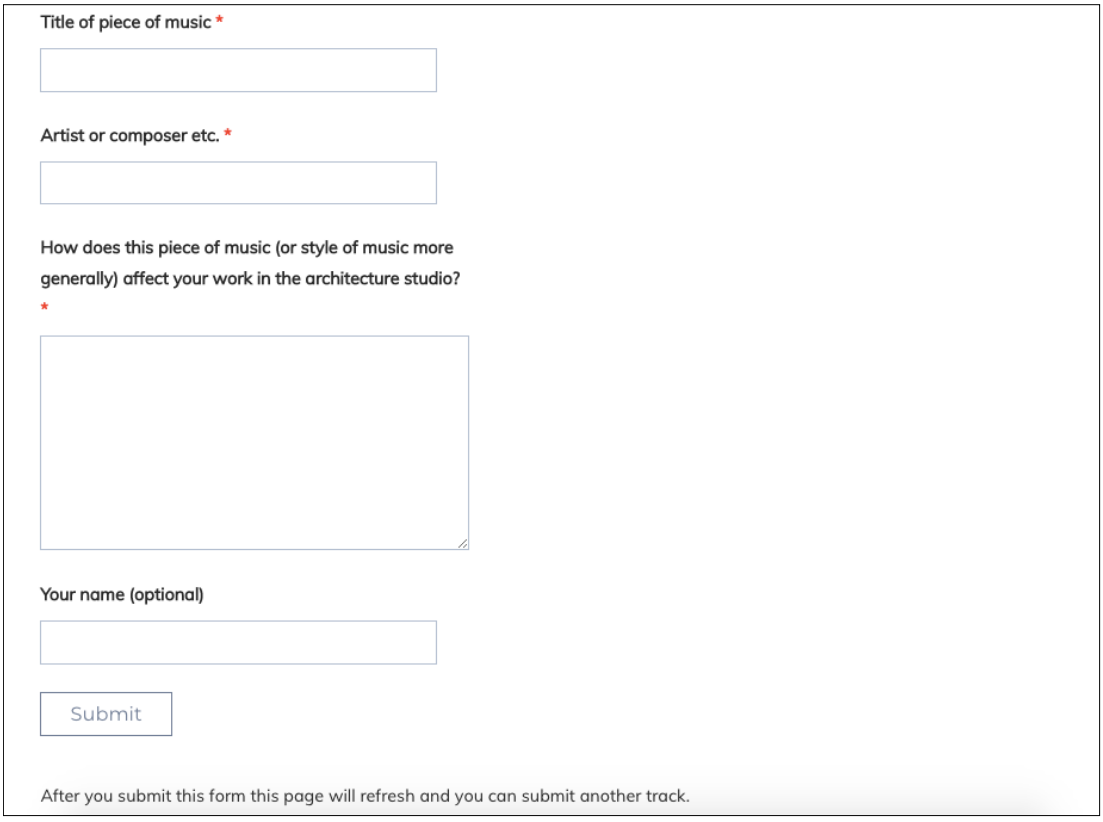
You can **submit as many tracks as you want** (for instance, perhaps you listen to different types of music at different times or for different purposes?)

The form can be **submitted anonymously** (for instance if you'd rather not share your taste in music with the world).

The information you share will help my thinking around the ways that students approach work in the Architectural Design class. I will also compile a 'studio playlist' and share it through this music/learning project I curate.

Thanks!

** Indicates required field*



Title of piece of music *

Artist or composer etc. *

How does this piece of music (or style of music more generally) affect your work in the architecture studio? *

Your name (optional)

Submit

After you submit this form this page will refresh and you can submit another track.

Appendix 4. Example of interview schedule for academic staff

Interview schedule for tutor on American History course
12 June 2017

Welcome and explaining the interview format
What I would like to do this morning/afternoon, is to ask a series of questions based upon what I have observed in and around the [American History] course. Within this I will be using photographs and sound recordings as prompts for discussion. Although I have a number of ideas I'd like to explore with you today, please do add anything else that you think is relevant and feel free to ask questions. I will also set time aside after I have asked all my questions to let you talk about anything you think is relevant that we haven't already covered.

Gaining consent
You have already completed the consent form however before we begin I would like to check that you are happy with what I want to do, as follows:

1. First of all, can I check that you understand the purpose of my research and that I'm not evaluating tutor approaches?
2. Second, it's likely that some of what you tell me today will be reproduced, anonymously, within my research. This could, for instance, be within my thesis, as well during conference presentations, on my research blog and elsewhere. Can I check that you understand and are happy that what you tell me to today might be anonymously reproduced as I have described here?
3. Third, it is possible that my work could be of interest to other researchers working in this field. Can you tell me whether you would be happy for a fully anonymised copy of the interview transcript to be shared with appropriate researchers, should that be requested?
4. Having explained the purpose of the interview then, can you confirm that you are willing to be interviewed today, where I will ask you questions about your experiences around assessment in the History course?
5. I would like to record our conversation today. Directly after the interview I will download our conversation to a password protected hard drive and will delete the file from this audio recording device. Can I check that you are happy for me to record our conversation in this way?
6. Finally, I would like to remind you that you can withdraw your consent to participate in this interview at any time. Similarly, you can withdraw permission for any of this interview data to be used in my transcript at a later stage, by e-mailing me. Can you confirm that you aware that are free to withdraw from my research in this way?

7. If there is anything that is unclear during the interview, please do feel free to stop and ask me. Do you have any questions for me at this stage?

Thank you for agreeing to participate in this interview today. I really appreciate your help.

Part 1: Perceptions of the course and assessment

- To begin, can you tell me what the [American History] course involves?
- I have an image here from a lecture: can you talk to me about what's happening? **[Tutor lecturing image]**
- And can you describe how you approach lectures?
- In a similar vein, I have a picture here from a tutorial can you describe your approach to tutorials? **[Tutorial image]**
- Something I am interested in within my research is looking at how 'knowledge' is conceptualised in different disciplines. Can you tell me about this from the History perspective?
- Similar to the last question, I am interested in what 'critical thinking' or 'being critical' means in different degree subjects: can you talk to me about this from the perspective of the [American History] course?
- **[Historian's toolkit image]**

Part 2: Approaches to assessment

- Can you talk to me about how the [American History] course is assessed?
- What do the different assessment exercises set out to achieve?
- What makes the essay appropriate to evaluate understanding and ability?
- Can you tell me what you think are the qualities and skills that a student needs in order to produce good quality work in the assessment exercise?
- And how do students acquire these skills?
- Something I have found really interesting in my interviews with students is getting them to talk about the process behind the preparation of the essay assignment. In a similar vein, could you describe what you do when it comes to marking essay assignments?
- Part of the final course mark is based upon class participation: can you tell me you approach this?
- Can you tell me how you try and communicate to students what represents high quality work around assessment?
- I have a picture here from the end of semester 1: can you tell me what is happening here? [**Q&A image**]

- Following on from the previous question, can you tell me more generally how students are able to get a sense of their progress and understanding during the course?
- The [American History] course has several hundred students: something I'm interested is how you establish a common understanding of what represent high quality work across a course team of 12 tutors?

Part 3: Learning spaces

- We have a picture here of the lecture theatre 4/5. Can you talk to me about what this is like as a teaching space? **[Lecture theatre from back image]**
- While I have been able to observe lectures, tutorials and office hours, what I haven't seen are the spaces where tutors mark student coursework: could you describe where you marked the coursework essay for the [American History] course?

Part 4: Digital resources

- Something that emerged during my interviews with students was how much importance they placed on the course reading list when it came to working on their essay assignment: can you tell me how the reading list is created?
- Over-and-above what is included in the reading list, do you have any expectations about the types of resources students should be using during the course?
- At different times during the course, tutors have encouraged students to listen to a History podcast: can you tell me more about this?
- I have a picture here of your slides from a lecture/tutorial: can you talk to me about how you go about creating these slides? **[Visuals on powerpoint image]**
- Has History teaching changed since powerpoint?
- Something I have noticed in lectures and tutorials over the last two semesters is how the use of images features in teaching: can you talk to me about this?
- I have a screen shot here of the Learn site for the [American History] course: can you tell a bit about the purpose of these pages? **[Learn site image]**
- I know that some students download the lecture slides in advance of class. Can you tell me why these are made available before class?
- When it comes to handing in their coursework assignments, students are required to submit it through Turnitin: this isn't something I have ever used therefore could you help me understand what it's about?
- As a final point, I understand that the university intends to roll out lecture capture technology next academic session: do you have any thoughts about that?

Closing remarks

- That is all of the questions I wanted to ask today. Is there anything you would like to add about the way you approach assessment that we haven't covered?
- More generally, do you have any questions for me, for instance about the nature of my research or how it will be used?
- If after today's interview other questions spring to mind, or I needed clarification on any points, would it be OK for me to contact you?

Thank you for taking time to speak with me today, as well as you wider contribution to my research over the last year.

Ends.

Appendix 5. Example of interview schedule for students

Interview schedule for student on Architectural Design course
5 May 2017

Welcome and explaining the interview format

As you know, I'm James Lamb and I'm a PhD. You have already heard me describe my research on several occasions, however just to remind you that that one of the things I am interested in is that ways that Architecture students approach assessment. I really appreciate your time today and, as a way of offering my thanks, I have provided you with a £20 gift voucher - can I check that you received this?

What I would like to do this morning/afternoon, is to ask a series of questions based upon what I have observed in and around Architecture studio. Within this I will be using photographs and sound recordings as prompts for discussion. Although I have a number of ideas I'd like to explore with you today, please do add anything else that you think is relevant and feel free to ask questions. I will also set time aside after I have asked all my questions to let you talk about anything you think is relevant that we haven't already covered.

Gaining consent

- Before we begin there are a few things that I would like to run through with you. These are really the same points that have already been covered in the participant consent form you have kindly completed for me.
- First of all, can I check that you understand the purpose of my research and that it has no bearing on how you are marked within the Architectural Design course?
- Second, it's likely that some of what you tell me today will be reproduced, anonymously, within my research. This could, for instance, be within my thesis, as well as during conference presentations, on my research blog and elsewhere. Can I check that you understand and are happy that what you tell me to today might be anonymously reproduced as I have described here?
- Third, it is possible that my work could be of interest to other researchers working in this field. Can you tell me whether you would be happy for a fully anonymised copy of the interview transcript to be shared with appropriate researchers, should that be requested?
- Having explained the purpose of the interview then, can you confirm that you are willing to be interviewed today, where I will ask you questions about your experiences around assessment in the Architectural Design course?

- I would like to record our conversation today. Directly after the interview I will download our conversation to a password protected hard drive and will delete the file from this audio recording device. Can I check that you are happy for me to record our conversation in this way?
- Finally, I would like to remind you that you can withdraw your consent to participate in this interview at any time. Similarly, you can withdraw permission for any of this interview data to be used in my transcript at a later stage, by e-mailing me. Can you confirm that you aware that are free to withdraw from my research in this way?
- If there is anything that is unclear during the interview, please do feel free to stop and ask me. Do you have any questions for me at this stage?

Thank you for agreeing to participate in this interview today: I really appreciate your cooperation.

Part 1: Perceptions of the course and assessment

I'd like to begin with some general background questions.

- First of all, can you tell me the title of your degree course?
- And can you tell me, why you chose to study this degree programme at university?
- How has you experience of the Architecture programme so far matched your expectations of what it would be like?
- As you know, I'm mostly interested in the Architectural Design course: can you tell me a little bit about what the course involves?
- And what are the different teaching approaches that are used?
- Can you talk to me about what is happening in this picture from semester 1 **[image: [student name] presenting]**
- Can you talk to me about what is happening in this picture **[image: [student name] tutorial]**

Part 2 Approaches to assessment

- Moving on to talk in particular about assessment, can you talk to me about this submission from the end of semester 1? **[student name portfolio]**
- And more generally can you tell me a bit about the different types of assessment that are used on the Architectural Design course?
- And can you tell me how information about is communicated about what is expected around assessment?
- Beginning with the project assignment, what do you think are the skills or qualities you have needed to use when completing this assignment?

- And moving onto the reflective portfolio: what are the skills or qualities you needed to use when completing that assignment?
- I have a photo here of your desk space in the studio. Can you describe what we can see here? **[image [student name] materials]**
- In the picture I can see lots of different materials on your desk. I'm interested to know how, when you make a model or a sketch or another piece of work, you decide which materials to use?
- And where did you learn how to work with these materials?

Part 3: Digital resources

- I would like to show you another picture now. Can you tell me what is happening in this picture? **[image: students and tech]**
- Can you tell me a bit about what the software does and how you have used it during the Architectural Design course?
- Are there any other bits of software you have used during the Architectural Design course?
- Where did you learn how to use these pieces of software?
- Something I've come to realise over the last year is that quite a lot of research takes place behind the creations of design work: can you tell me how you have gone about this research?
- You're wearing earphones in the picture: can you tell me a bit about that?
- And can you tell me a bit about how you select the music you listen to on these occasions?
- I have another photograph here **[photograph of group watching as students present/ defends work]**, taken during the Review exercise: can you tell me what is happening here?
- Can you describe your experience of the Review to me?

Part 4: Learning spaces

- I have a picture here of your bay in the architecture studio. Can you tell me a bit about this space? **[image: [student name] studio bay]**
- This is a picture taken at another time and it features your desk: can you talk to me about what we can see in the picture? **[image: [student name] desk]**
- We can see food and drink in the photograph: that's something that appears with regularity across the photos I've taken over the last year. Is there anything you can tell me about food and drink in the studio?

- We've talked about the design studio. Are there any other places you have tended to work on the architectural design project? **[Another space from submitted photos]**
- Can you tell me what has influenced where you have decided to work on the project?
- Finally, I noticed that this sign went up on the studio door towards the end of term. Can you tell me what this is about? **[Late working notice]**

Closing remarks

- That is all of the questions I wanted to ask today. Is there anything you would like to add about the way you approach assessment that we haven't covered?
- More generally, do you have any questions for me, for instance about the nature of my research or how it will be used?
- If after today's interview other questions spring to mind, or I needed clarification on any points, would it be OK for me to contact you?

Thank you for taking time to speak with me today, as well as you wider contribution to my research over the last year. I have really appreciated your input and cooperation and would like to wish the best of luck in your continuing studies.

Ends.

Appendix 6.
Example of summary notes from an interview (anonymised)

Timing	Summary of conversation
0:00	Preamble
2:51	Tells me why he chose to study Architecture at university. He turned 25 in April. Went into employment after school. Then went to college to do HND in Architectural Technology. Decided he was interested more in Architecture so applied to do that. He wanted to do design rather than technology.
5:18	Have your experiences matched expectations? Came in with a good idea from college. Knew that crits "would be brutal" and the hours would be long, but that it wouldn't be as hard Physics. Was surprised how "art school" it was in first year. One of the three courses was entirely art and design that he wasn't ready for. He's more of a technical artist than a "floral artist". That course in no longer part of the Arch programme. The entire first year was "manual drawing" rather than computer-based, which he really liked: getting the drawing board out, even if he lost some of the skills he had developed at college around 3D modelling, which isn't taught. There's almost a sense in the programme of computers being bad (in first year) so everyone learns to draw by hand even if you could already do it. The volume of art stuff in first year took him by surprise. Much more architecture-focused in second year. You spend a whole week on working with timber, working with brick etc.
10:10	A disappointment is you're expected to know the technical design skills but they're not taught. Staff illness. This has meant there's been a great variety in quality of work when it comes to the exhibitions of student work. Everyone's pin-ups have their own merits.
13:00	He describes being part of a large extended friendship group that stretches across the course. 30 of them were up north that weekend together. They all draw on each other's abilities and knowledge to help each other. More difficult for those students not integrated into these groups who are less able to draw on this peer support and this can be seen in the quality of pin up work.
13:44	He refers to a render. He explains that it is a photo-realistic reproduction of a 3d model that you've created. He'd normally model in Autocad, but other students use the more basic SketchUp, or if more advanced use Rhino. It's to mock up a 3d representational image of a building and then you take a viewpoint of that, run it through a programme - export the image into a rendering add-on or programme. Normally takes quite a few hours. Takes it from a very basic 3d screen image to something that is more photorealistic, that can then be taken into Photoshop to be given background and so on to make it look a picture of a real building.

15:29 He refers to “elemental”: focusing in on particular aspects of construction. An element of construction. Describes how in year 1 they focused on an element of a building. Helped to give them a sense of how different materials could work.

18:30 Software types: Rhino can only be used for 3d modelling. The essential ones include auto cad for drawing up plans and section. Adobe Photoshop and Indesign are other essential ones in year 2. Indesign is essential for the portfolio which accounts for a huge amount of marks they are given. Photoshop is important for editing and touching up images e.g. model photos. To get the desired effect for portfolio you need to take a photograph of the model, and then clean it up in photoshop, tidying up any imperfections.

21:40 Methods of assessment on the course: Final Exhibition (A1 pin up, drawings, models) and portfolio. The portfolio is a record of their work across the semester. Theoretical and development work. Shows where thinking came from. Explaining why building is what it is.

23:40 Research. “Precedent research”. Learning about things other architects have done and what worked and what didn’t work. Talks about a building in Brussels as influencing his work. Describes the ethos of his library design. Precent work took place across several weeks. He learned how a library could work. Talks about visit to Rome and how it worked. Describes going around Rome drinking coffee in order to get a sense of how cafés work, as his library was to have a café.

28:10 Discussion around photo. His space in the design studio. This was Just after the review, the first crit type exercise. He buys 20 metre rolls of trace and works through layers and layers and layers of plans. Trialled and failed ideas are necessary in order to take design to the next level. He was building on feedback from the review. He describes learning through failure. He describes materials in photograph: plastic, ready-mixed convy (?), plaster of Paris. Talks about air bubbles in plaster of Paris creating imperfections. Ended up sanding down mistakes and created a surface that worked well. Folded aluminium. Concrete.

34:20 How do you learn to work with these materials? “Hope for the best”. Casting is fairly straightforward. Lots of help from his Dad who was a trained sculptor but now is a dental technician, and was able to get him a bag of dental stone plaster that is rock solid and less brittle. Plaster of Paris is cheaper but not as good. There’s an alternative to plaster of Paris but its four times more expensive.

36:25 Is work affected by money? Completely, although often overlooked. Very serious reliance on available funds. You just have to accept it and deal with it. Or be less experimental or pare things back. Materials are expensive. And then printing on top of that. Big long print-outs are expensive. You can sometimes get round cost of materials for models but not printing. Describes going to Wickes to get concrete. It helps to have a car as it means he can access cheaper stores away from city centre. The art college shop is more economical than other nearby art stores. It can sometimes be half the price compared to the shop near campus, depending on what you need. And this matters if you want to exhibit on good quality paper, which he says does affect the grade.

39:17. Discussion around photo. *Tupperware and tea*. Sustenance. Tupperware reflects desire to reduce cost. Spends so many hours in studio its very easy to fall into a routine of going out to Sainsbury or Tesco or to restaurants. So started making pots of soup and bringing them in containers and heating them up in common room for dinner. And brings in own kettle for tea, hanging milk out the window to keep it cold.

40: 50 Discussion around photo - *Notice on door about working hours*. Met so much resistance that it just gets ignored. Officially they have to put this up, but its not really enforced. Can see why they do it, to avoid breeding an all-nighter culture. Describes being in the studio at 5am this semester.

43:01 What's it like working in the design studio? A lot of people don't love it as it can be quite distracting. He generally finds it better than trying to work at home. Puts in ear phones and zones out. Tries to avoid speaking to friends in other studios. It can be very productive but also unproductive. Towards end of semester quite a lot of people moved into the crit room as its a different space and there's nothing there but your desk so you just work. You spend so long in the studio it becomes very comfortable: you've got a whole year's worth of things there. It almost becomes home. Although you try and set it up as a workspace you can find yourself having lost two hours staring at Youtube.

44:40 Discussion around photo - *Photograph inside flat*. Last day before portfolio permission. Is able to work on portfolio at home but not design work. Dining room table in the flat with coffee. He and girlfriend doing the same course. Comfortable flat. Lots of spaces to study. The portfolio work is the only work he can do productively at home.

46:59 Talking about audio clip with music that he submitted with the above photo from his flat. Describes why he's listening to music. Spend almost entire day in same place working, drinking and eating crap food.

49:15 Discussion around photo - *set of speakers in crit room*. They were having a break in there and listening to some music.

50:05 Discussion around photo - *car dashboard*. Towards end of course. Had lots of books from the library he'd acquired and there were so many he had to put them in car. And he picked up materials for the exhibition at the same time.

51:00 What do you use library books for? Mostly precedent research. A mixture of his books and girlfriend's books here in picture above. Precedents can come from art books that most architecture students wouldn't think of. Books about particular architects, design manuals.

52:07 Do you use online resources as well? Quite heavily. Moreso than the books. Online useful for quickly looking up ideas or suggestions and options. That's how lots of people originally pick up on ideas. From Arch Daily or Dezine which the two most common websites. Architectural journals online are also really reliable sources and they always have recommended articles to look at, for instance on how to use materials. Find stuff you wouldn't otherwise.

54:54 Discussion around photo - *Photo in design studio*. Semester 1. Presentation for initial architecture school idea. Everyone had to present the idea they'd developed over the week. From there tutor created the groups for the project. Discusses how group exercise worked in terms of whose ideas came to the fore.

56:50 Talking about working with others. Gets second opinion from friends. And describes how he found the presenting exercise fine. He was able to draw on previous work experience so wasn't fazed at having to introduce things to people. He treated his design as a product to be introduced to customers

59:14 Review lite exercise. Prefer's review lite to just presenting to an audience. Review lite is better as its much more of a discussion. Describes how it worked with the two tutor approach. The review lite approach varies across different tutor pairings.

1:00:59 Discussion around photo *Photograph from second semester*: One of the final tutorials. Almost at the point of a final design. Talking through some ideas with Isobel Law giving feedback. Isobel did tutorials in pairs. Preferable to the larger tutorials that some others did. Describes how it worked.

1:03:16 Any other teaching approaches? Describes working with Natalie, primarily from Tech class. How to improve sections. 3-4 groups. In the Gallery. Not sure if there were any lectures in second semester. Discusses value of lectures. Stopped going as didn't find them good use of time or relevant. Abstract or odd.

1:06:52 How is information communicated about what's required? Mixture of email and directly from tutors in tutorial. Tutors agree what is needed as a team and then communicates it to students. Also, it is influenced by individual tutor. Has led to considerable variety in approaches and work presented across the design studios, for instance in work pinned up for exhibition. Guidance varies across bays, geared towards preferred style of the tutor.

1:10:37 Learn Site. Would access it occasionally. More useful for courses with less contact time. But in this course you were guaranteed at least 30 minutes with a tutor each week which is really unusual. But in other courses he would use learn more, for instance uploading information and accessing content.

1:12:26 What is the AD course about? The nuts and bolts of the architecture course. There are lots of supporting courses e.g Arch History, but AD is where you really do the architecture. Talking about the value of Arch History course. And Technology and Environment including regulations and so on, the technical side.

1:14:16 Do you want to become an architect? At the moment yes. Bonus of Arch degree is that it can lead into lots of different design jobs.

1:15:18 How is Arch History and Tech assessed? Tech a very mixed bag. History very rigid and established and assessed through exam, essay and presentation. Describes how Arch History course works. Very literary based.

1:17:00 How do you find the contrasting assessment types? It's good. AH is good as you feel like a regular student for a while, doing essays and exams. For Tech each tutor has changed assessment quite dramatically, varying from multiple choice exams, to case study projects. A different tutor this time and it has been much better. He altered things. Got rid of exam and used a series of three essays, divided around the sections of the course. And then projects on top of that. Goes on to discuss assessment on the course in more detail.

1:20:43 On the AD course, what are the skills and qualities needed to be successful on those courses? Hard shell. To be able to take critiicsm. That criticism doesn't mean people don't like you, it's about suggesting ways of improving your work. There's a misunderstanding of the review culture. It emulates a client-architect situation.

1:22:15 How do you feel about the way you get this feedback? Quite successful. Varies between course organisers. Describes how course organiser is against the crit culture although its still a crit. It is more friendly. But he's not averse to the more conventional crit as used in first year. But that approach did upset people more, but there was still value in forcing you to be clear in expressing your ideas to someone who doesn't know anything about you. This course could have had more peer review.

1:24:40 How do you feel about weekly feedback from tutor? Each Tuesday Isobel would email thoughts on previous week, plans for next week and running order. But it would have been good to spend time with other tutors. Explains value of being exposed to other tutors. Isobel as an architect focuses on the practical, that he agrees with, but it means he and rest of group have focused less on other approaches. Describes contrast with Victor's approach in Group 2. Talks about Victor and Isobel's approach and how that likely manifests in student's work.

1:27:54 Any other skills or qualities needed? Resourceful. It's not the tutor's job to teach you to use a programme so a lot of the output is under your own stream. Draws a parallel with students doing research on other courses, they have to self-teach or seek out guidance in order to use CAD etc. But it does bring in a time pressure. Talks about being able to find help on Google etc.

1:29:30 Returning to 'computers are banned' from earlier in interview. Refers to applicant day and being told that and drawing was the thing in first year. He describes it as being nostalgia. Nice but no longer relevant in Architecture. Strange when the university is prestigious. Talks more about emphasis on drawing in first year and how it compares with the approach from other universities. It should be a bit of both he says, drawing and emphasis on computers.

1:33:11 Draws to a close.

Appendix 7. Example of collated field recordings

File title	Date recorded	Duration	Brief description	Located at:	Event/Activity
Arch studio 6 Dec 10.wav	6 Dec 2016	00:34	Whistling, sweeping.	Blue USB	This is recorded as students are preparing for exhibition of work later in the day
Arch studio 6 Dec 11.wav	6 Dec 2016	10:37	Me asking group why they want to do architecture: Yvonne and students from next bay, Matthew. Conceptions of what the job or Arch is and lots of other topics.	Blue USB	This is recorded as students are preparing for exhibition of work later in the day
Arch studio 6 Dec 12.wav	6 Dec 2016	5:29	Suzie, Edward, Darren. Talking about how to clean the floor. Tables being moved. Studio chatter. Studio ambience. Photographs clicking. Coughing. Richard speaking to me. Richard sending Beth to get rolls of paper.	Blue USB	This is recorded as students are preparing for exhibition of work later in the day
Arch studio 6 Dec 13.wav	6 Dec 2016	01:22	A mobile phone ringing. Suzie and Darren setting up their work, rustling of paper.	Blue USB	This is recorded as students are preparing for exhibition of work later in the day

Appendix 8. Example of a participant consent form (student)

Participant consent form for PhD research

James Lamb, PhD student, Room 1.10, Thomson's Land, Moray House School of Education, University of Edinburgh. j.i.lamb@sms.ed.ac.uk
Supervisor: Professor Sian Bayne sian.bayne@ed.ac.uk

My research is concerned with the ways that meaning is constructed and communicated within two contrasting undergraduate courses (in Architecture and in History). My research comes from the position that the increasingly digital nature of education and society provides us with new ways of making meaning. In particular I am looking to understand how assessment in the Humanities (for instance in a History course) might be affected by our increasingly digital and visual world where meaning can be conveyed through a broader range of 'modes' (as is the case in Architecture, for instance). To address this question I am undertaking the following field work:

1) **Observation of students and tutors** in the classroom and other settings that offer insights into the design, delivery, preparation and marking of coursework assignments. This will include gathering field notes and course documentation, and taking photographs which I will later analyse in order to understand the different resources that students and tutors use as they communicate ideas.
2) **Semi-structured interviews with students and tutors** which will explore attitudes, approaches and experiences around assessment. These interviews will be undertaken confidentiality and after the end of the course.

In each case, **my field work will have no bearing on the evaluation of student work**. I am interested in understanding how meaning is constructed and communicated but: **I am not setting out to evaluate student performance or to critique tutor practice**. Full details of my research can be found on my research blog at: http://www.james858499.net/about.html.

Providing your consent to participate in this research

I am willing to be observed within class and similar settings during the Architectural Design course (please tick if you are willing to be observed): ☐

I am willing to be photographed, and for my work to be photographed, as I participate in course-related activities (please tick if you are willing to be photographed):

I am willing to participate in an interview after the end of the Architectural Design course where I will be invited to discuss my experiences around assessment (please tick if you are willing to participate in an interview):

Confidentiality and use of data

I understand the purpose of this study, and that I am able to ask questions about it at any time.

I understand that I am free to withdraw my consent from involvement at any time.

I am willing for anonymised extracts from my interviews to be used as part of the study.

I am willing for photographs of myself and my work to be used in outputs from this project (for instance in a research blog and during conference presentations).

I understand that any data I provide will be fully anonymised, encrypted and stored on the researcher's password protected computer, with a back-up copy held in the Moray House School of Education.

I understand that the data collected will - though fully anonymised - appear in publications relevant to this area of research.

Name in capitals:

Signature: **Date:**

Thank you for taking time to complete this form.

James Lamb, September 2016

JL