BLENDING LEARNING AND TECHNOLOGY:

Degree Studies at Vocational Training College as a Case in Point

Submitted by

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Abstract

Blended learning is commonly defined as teaching and learning that combines digitally mediated and face-to-face activity. While the infusion and growth of digital technology into classrooms and beyond is said to have had the effect of transforming educational practices, educators talk of the unease that is experienced between what 'should be' and what 'is' when using educational technology in practice (Selwyn, 2014). There is a need for studies that challenge the qualities reified in discussions on educational technology such as 'affordance', 'open', or 'ubiquitous' and that articulate the lived reality of blended learning. Using actor-network theory, a materialist approach firmly based upon observation of actual events, this study explores blended learning as a sociomaterial practice in a higher education setting within an undergraduate business communications course.

Departing from thinking about technology as a discrete artifact (Scott & Orlikowski, 2014), the study demonstrates the significance of material agency in the everyday practices of blended learning. Rather than a nexus of online and embodied activity, or a dualism of human/tool, the study extends the common understanding of blended learning by arguing that it does not exist outside of the relations that produce it. Viewed relationally, blended learning is an emergent practice, constituted by human-material co-agents (Michael, 2000). In the case under study, it presents as a heterogeneous assemblage of bytes, buildings, talk, smart 'phones, learning systems and notes, among other materialities. Towards achieving a detailed tracing of the everyday practices of students when engaged in blended learning, the empirical material collected for the study involved learning management system log data, student discussion texts, classroom activity sketches, images of campus common areas and individual interviews. Technology was found to play a constitutive rather than a mediating role, producing blended learning as an effect.

By using a concrete example of achieving the blend in blended learning, the chief contribution of this study lies in offering a more than constructivist approach that dismantles the notion of blended learning holding together as a discrete entity, realised through human agency alone. Practitioners of blended learning could, with profit, reflect on how spatial, digital and embodied learning encounters are performed through diverse sociomaterial practices. Further, blended learning designs that allow for the hybridity of practices will provide improved opportunities for students to learn in both embodied and digital encounters on-campus and online.

Declaration of Originality

I certify that this is my own work and that appropriate acknowledgement has been made within the text to all other materials used. This thesis is fewer than 55,000 words in length, excluding tables, graphics, the bibliography and the appendix.

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Candidate

.....

Date

Preface

Some sections of certain chapters in this dissertation have appeared, or may appear in publications as follows:

Stevens, T. (2013). Who you know and what you know: Student Interaction in Online Discussions. *Australian Educational Computing*, 28(1), 47–60

Stevens, T. (2015). The search for meaning in the term blended learning. *The Journal of Digital Learning and Teaching Victoria*, 2(2), 29-32

Stevens, T. (2016). I "see" what you are saying: The analytical work of diagrams in online discussions. *Australasian Journal of Educational Technology*, 32(4)

List of Abbreviations

ANT	Actor Network Theory
ARE	Action-relevant Episodes
BL	Blended learning
CMC	Computer-mediated Communication
CMI	Computer-mediated Instruction
CoI	Community of Inquiry
CoP	Community of Practice
ICT	Information and Communications Technology
IT	Information Technology
LMS	Learning Management System
LO	Learning Object
MB	Mega Bytes
RAM	Random Access Memory
SNA	Social Network Analysis
STS	Science and Technology Studies
TEL	Technology Enhanced Learning
VET	Vocational Education and Training
VTC	Vocational Training College
Wi-Fi	Wireless IEEE 801.11 compatible

Acknowledgements

This work originated from an interest in understanding how my use of technology in my own teaching practices might make a difference for the students taking classes in management and organisational studies. I needed to better understand educational technology in a grounded, practical way. Those with whom I have shared my learning over the past few years have enabled that to happen.

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Chapter 1

Introduction

An 'I' Story

Thirteen years ago, I entered the realm of vocational education in business studies at a time when certain online technologies were poised to create what has sometimes been described as 'transformational change' in teaching and learning practices. Joining a large metropolitan vocational studies college, I was introduced to the Blackboard Learning Management System (LMS). The offer of a space providing a practical and convenient way of locating and presenting learning resources seemed to have potential. The LMS enabled storage of learning materials, a facility for administering knowledge tests, a space for discussion and a variety of other functions. As I grew to understand the LMS and its functions in the months that followed, I realised that it also provided me with a way of monitoring learning activity and participation. I observed evidence of student participation and engagement through activity logs. Despite this, my efforts at understanding what I saw as 'engaged' students and how this was manifested in the data were sometimes inconsistent with my own conclusions drawn through direct observation in the class. This suggested to me that there might be alternative ways of considering and understanding how students interact with their learning technology and their peers. Initially, the concept of social network analysis, and as a by-product, learning analytics, caught my attention. Understanding and interpreting how students use their technology in online learning led me to some early experiments in learning analytics through social network analysis (SNA). Again, using the aggregated social network data led to some interesting observations, but left a sense that more needs to be done to understand the material relations that develop between students and their technology use. Against a backdrop of studies in learning analytics, communities of practice, and educational e-learning design models, my interest remained in the material aspects of blended learning that combine instructor-led and online modes. To this end, I have turned to examine the sociomaterial aspects of the blended learning experience, taking an instance from my own close-at-hand experience.

Statement of the problem

Blended learning, an approach that uses a "wide variety of technology/media integrated with conventional, face-to-face classroom activities" (Dziuban, Picciano, Graham, & Moskal,

2016, p.6), now seems a fixture in day-to-day higher education practice. Yet, and as Picciano, Dzubian and Graham (2014, p.13) suggest, "limited efforts have been made to understand the development and use of theory in the domain of blended learning research". Fenwick & Edwards (2010a, p.84) argue that the infusion of information and communications technology (ICT) into many aspects of higher education invites examination of how practices across "multiple sites are or might be mashed up as learning in an educationally worthwhile way" and that this examination is "a major pedagogic question".

The emergence and growth of blended learning also suggests a need to examine it closely: in Australia, over 275,000 students were enrolled in 'multi-modal'[1] and external undergraduate level courses in 2016, representing some 22 percent of all enrolments in the university sector (Australian Government Department of Education, 2017). The rapid uptake of mobile applications in blended learning also invites attention, for example in 2012, Swinburne University[2] reported that 8,500 students joined their new mobile LMS platform in the five-week period after its introduction (Maslen, 2012). This reflects an international trend: "blended learning is on the rise at universities and colleges" (Johnson, Adams Becker, Estrada, and Freeman, 2015, p.16).

Despite being tagged the "new normal" by Porter, Graham, Bodily, and Sandberg (2015, p.17), attempts to implement change in teaching strategies using ICT in learning environments have had mixed results (Ocak, 2011; Samarawickrema & Stacey, 2007). Theoretical underpinnings informing the design of blended learning vary widely, which "creates daunting challenges at the front end of the design process" (Harris, Connolly, & Feeney, 2009, citing Garrison & Kanuka, 2004). Further, educational practitioners describe a 'disconnect' between the potential of technology on the one hand, and the actual experience of the user – be that of teacher or student. This emanates partly from what might be seen as the inflated claims of technology providers (Selwyn, 2014b). For example, the "WalkMe" (2017) learning application provider claims that it "accelerates employee time to competence and allows employees to learn as they work so no time is wasted". The "Moodle" (2017) learning management system positions itself as "an open, collaborative effort by one of the largest open-source teams in the world", and Blackboard (2017) suggest that they are "pioneering advancements in teaching and learning and creating powerful analytics to drive learner success and institutional performance". What do these statements mean for a particular learner and a particular technology in a particular learning setting?

Selwyn (2014a, p.vii) expresses concern about "the gulf that persists between the rhetoric

1. Defined as a combination of on and off-campus attendance.
2. Located in the state of Victoria, this is one of 43 accredited universities in Australia.

of how digital technologies could be used in education and the realities of how digital technologies are actually used in education" (original emphasis). Turning to the discourse of 'technology enhanced learning (TEL),'[3] Bayne (2015, p.5) suggests that a lack of critique on TEL terminology has meant that it has been "adopted as an apparently useful, inoffensive and descriptive shorthand for what is in fact a complex and often problematic constellation of social, technological and educational change". A lack of critique leads to ideas about educational technology or its in-use applications becoming reified.[4] For example the idea of 'open' access giving rise to the independent and self-directed learner, with an 'idealised' set of qualities (Knox, 2013, p.822); or the idea of 'ubiquitous' access to the internet (or the college Wi-Fi), said to support flexible learning, anywhere and anytime, "disrupting, dispersing and redesigning the practices and possibilities of pedagogy in the digital age" (Swist & Kuswara, 2016, p.111).

Blended learning itself has been described as having 'transformational' potential (Garrison & Kanuka, 2004). Horn and Staker (2015) suggest that 'blending' might be used as a disruptive innovation to improve schools. What does 'ubiquitous access', 'disruptive innovation', or 'educational transformation' mean in the practice of day-to-day blended learning, given that "on a day-to-day basis … the digital tends to be experienced as routine and unremarkable" (Selwyn, 2016a, n.p.)?

Rather than challenge these qualities that seem to be – for now at least – "educational common sense" (Selwyn, 2013, p.3), I see a need to study blended learning as a "phenomenon whose importance is worked out in practice in particular times and places" (Scott & Orlikowski, 2014, p.874). Departing from the reification of what might be considered foundational concepts, there is a need for studies that "reframe our understanding of reality as a contingent and practical accomplishment" (Orlikowski & Scott, 2015, p.700).

Addressing the problem: Methodological approach

The idea of a 'contingent and practical accomplishment' suggests that 'foundational' concepts of blending learning and technology will be open to challenge if we consider reality as an ongoing process (Orlikowski & Scott, 2015). Can technology (for example the internet or the smart phone) truly carry the property of ubiquity? What about 'black spots', network outages

3. A term accepted in the UK and Europe as "describing the interface between digital technology and higher education teaching" displacing other terms like e-learning or computer-based learning (Bayne, 2015, p.5)

4. I have used the term reified quite specifically here. In this context, it applies to concepts or terminology that become commonplace, which in turn have the effect of 'glossing over' the complexity that might be apparent by taking a more careful, considered or contrary approach to the term-in-use. Reification represents a kind of "black box" (Latour, 1987) where we accept that certain inputs will result in unproblematic outputs, for example: (1) 'a learning application' that results in (2) 'accelerated time to competence'.

and flat batteries? The internet and the smart phone might always be around, but they are not necessarily always available to afford learning. How is ubiquity experienced by different learners, and how might we characterise this without reifying it? I argue that there is a gap in the studies of blended learning that offer a type of granularity needed to complement existing studies – set as they are within what I would characterise as grand-tech narratives – for example those examining the 'community of inquiry', or 'social media', or perhaps anything with 'ubiquitous', 'massive' or 'open' relating to education in its title. This granular or practice-focussed account is in line with Selwyn's (2014a, p.16) call to "slow down" in order to create a local account and is consistent with my interest in exploring the gaps I described above between what it was that I thought technologies could provide for me as a teaching and learning solution, and how it is that learners themselves experience these things in practice.

This means exploring the routine and unremarkable practices of *blending* learning (as distinct from *blended* learning) in the sort of detail that is not accessible in existing studies of blended learning. Assembling a study of this nature, where the contribution of all actors is to be appreciated (large, small, mundane, breathing, thinking, digital, discursive, simple, loud, hidden) requires a way of revealing how these relations are 'done' – human and material, hidden and obvious. This is no 'leap of faith', but a purposeful and potentially uncomfortable shift in my own thinking to allow the complex, challenging, non-linear, heterogeneous learning-scape of the study to reveal itself. I do not see learning as a human-only accomplishment, nor do I see technology as having essential qualities (ubiquity, affordance, openness).

It is therefore necessary to include the *materiality of practices* in accounts of blended learning, divergent though this might be from historical – and I argue contemporary – functionalist and socially constructed accounts of teaching and learning in the digitally-mediated environment. Distinctive in the context of studying blended learning, material-semiotic studies afford a more inclusive and comprehensive view of the agency and participants involved in the practice of blended learning. This is an appreciation of the varied, emergent, relatedness of these participants, be they: bodies, texts, movement, places, bytes or the myriad other actors that assemble in practices.

To reconceive the role of matter and the material in human practices (Edwards & Fenwick, 2014, p.1385) requires a sociomaterial perspective, providing me with an empirical focus on practices close-up. This means avoiding aggregates (like 'community') or categories (like 'ubiquitous' or 'open-source') in the first instance and looking at how practices emerge in the relations between actors in a given setting – be they material or human.

Theoretical rationale

Since the purpose of the study will be to examine blended learning 'close-up', a detailed tracing of associations among actors in the learning environment is needed. In the broader literature on computer use, Twining (2010, p.165) suggests that there has been a need for greater 'detail in the data' supported by the use of observational techniques, which "fits with the use of case studies, [enabling] aspects of educational IT use to be explored in depth, using a range of quantitative and qualitative techniques".

Actor-network theory (ANT) emerged as an approach to the study of knowledge practices in science and technology and allows the researcher to learn from actors without "imposing on them an *a priori* definition of their world-building capabilities" (Latour, 1999, p.20) – a way of learning not only what actors do, but how they do it. As it happens, some of these actors are 'things' rather than people. By considering 'things' and people *for analytical purposes* to be of equal importance (considering them 'symmetrically'), it is possible to re-consider how learning practices come into being, how they are held together and how they endure or disintegrate. Although its proponents would suggest that ANT is not in itself a theory, they *would* say that it is empirically grounded in case studies (Law, 2009a).

Taking my cue from Law (2009a), I suggest that utilising ANT perspectives and sensitivities to examine learning practices well affords drawing from a range of different case studies and theoretical resources. In an educational setting, learners are considered "participants in networks of practices and learning emerges as an effect of the network" (Thompson, 2012a, p.252). ANT is well suited for studying blended learning which can be considered a complex and mobile practice which takes not only the role and contribution of learners, but also the "pervasive role and energy of objects" into account (Thompson, 2012b, p.95). Although ANT is not a learning theory, by considering the sociomaterial aspects of particular webs of relations, it is possible to understand how knowledge production and pedagogical practices are enacted in dynamic and overlapping networks. ANT has been harnessed to provide diverse accounts of knowledge practices including: informal learning in voluntary community organisations (Aberton, 2011); learning experiences of self-employed workers in online communities (Thompson, 2012a); professional development in the teaching profession (Mulcahy, 2012) and implementation of learning technologies (Luck, 2008).

ANT has at times been characterised as: a sensibility, or something to think with (Gad & Jensen, 2010); a "disparate family of material-semiotic tools, sensibilities, and methods of analysis" (Law, 2009a, p.141); and a 'non-humanist disposition' (Jensen, 2004). It is a socio-material approach to knowledge practices such as blended learning that enables me to

consider how different 'actors' – material and human – transform in their "movement between practices" (Gad & Jensen, 2010, p.57). Describing what 'things' – and what people – 'do' in a chosen setting provides the opportunity to consider heterogeneous networks that go beyond the 'social' in a traditional sense. Latour (2005, p.131) argues it is possible to "provide an actor-network account of topics which have in no way the shape of a network – a symphony, a piece of legislation, a rock from the moon, an engraving".

Sharing the view that major pedagogic questions attach to the practice of blended learning, I have found the characterisation developed by Wise (2011) a helpful framing of the contrasting ways that technology might be considered in the study of blended learning. He suggests (in a more generalised context) that human-technology interactions can be considered in three ways: (1) technology as 'hardware' that has a distinct and separate existence to the 'human' element. Each might act upon the other yet they remain distinct. For example, a computer can be considered a neutral tool that is 'used' by a teacher; (2) technology in its context. Here, albeit that humans and technologies remain distinct, the functions and uses of the technology are taken into account. For example, a tablet device might be considered one aspect of the learning environment of the student; and (3) technology as an articulation, meaning that "different elements can be connected (articulated) or disconnected in order to create unities or identities" (ibid., p.97). Here, context is seen as constitutive of the technology and vice versa and the con/dis/joined elements are disparate; they can be objects, ideas, social groups, individuals such as teachers and learners and so on. It is through the study of material practices that these articulations become understood. The present study grasps the opportunity to investigate blended learning and student participation in it from this third perspective.

Assumptions taken into the study

It is assumed from the outset that interaction and learning in a blended environment is socially and materially constituted and produced. I am concerned with exploring practices in and of themselves (Thrift, 2008) considering: "how the social is emplaced within the materiality of the world" (Latham & Conradson, 2003, p.1901). Actor-network theory provides a performative perspective on learning where the term performativity accents practice – reality does not exist outside of its 'doing' in various and different practices. In other words, nothing has reality, or form, outside its performance in webs of relations, with performances being defined as "material processes, practices, which take place day by day and minute by minute" (Law & Singleton, 2000, p.775). Thus, rather than pre-formed (an 'objective entity' out there called blended learning), this learning can be thought to *take form*, in practices. Practitioners of actor-network theory explain the turn to performance in this way:

> The turn to performance is sometimes seen as constructivist, but it has particular implications. It suggests that technologies, knowledges, and working may be understood as the effects of materially, socially, and conceptually hybrid performances. In these performances different elements assemble together and act in certain ways to produce specific consequences. … Performances are material processes, practices, which take place day by day and minute by minute. Since performances are specific, this also leads to multiplicity, so that what appears to be one thing (an "object," "working," "knowledge" [and I add, "blended learning"]) may be understood as a set of related performances (Law & Singleton, 2000, pp.774-775).

Guided by the assumption that practices or doings are central to the conduct of an inquiry that is led by actor-network theory, I need, as a researcher, to follow the doings (actions) of participants in the practice of blended learning. Thus, the actions that may be of consequence in the practice of blended learning include: social connections; human-machine connections; machine-human connections and others.

Research Questions, Key concepts and Conduct of the Study

The key questions guiding the inquiry are as follows: (1) What counts as blended learning in contemporary educational practice? (2) What is the role and contribution of technology in the practice of blended learning? (3) How is blended learning practised in the context of degree studies at a vocational college?

My interest is in education conceived as a sociomaterial practice: the everyday interactions that involve 'getting things done' as students learn (Fenwick, Edwards, & Sawchuk, 2011). To explore this, I examine the practices that constitute learning and this means an attentive and careful reading of research data as entanglements of technology, people and practices (Dolphijn & van der Tuin, 2012). This study explores various types of student interactions within a blended learning environment – one where an instructor-led approach is complemented by employing online information and communications technology (ICT). The specific educational setting for the study is an undergraduate business degree program first year study unit (Business Communications) conducted at the Vocational Teaching College (VTC), a multi-campus educational institution located in the South-East of Melbourne, the capital city of the state of Victoria, Australia. The cohort of interest was 80 students studying in their first year of a three-year Bachelor's degree in business. Before discussing how the study was undertaken, I take the opportunity to clear some conceptual ground as each of the concepts blended learning, mobile learning and e-learning has relevance in the college context in which the research was carried out.

BLENDED LEARNING

How 'the blend' of technology is employed in teaching and learning in recent years reveals concerns with: (1) definitions (Graham, 2006; Graham, Henrie, & Gibbons, 2014); (2) design (Rossett, Douglis & Frazee, 2003; Stein & Graham, 2014); (3) interaction (Stevens, 2013; Wagner, 2006); and (4) user 'acceptance' of technology in teaching and learning (Ertmer, 2005; Friedrich & Hron, 2010; Ocak, 2011). Many of the sources cited here are from papers or book chapters that explore, explain or theorise blended learning, but the meaning of the term blended learning itself is a vexed one, of interest for well over a decade.

A prevailing view suggests that blended learning combines "face-to-face instruction with computer-mediated instruction" (Graham, 2006). An extension of this concept is a continuum of e-Learning, suggesting a scale from lower level, simpler technologies (like slides) to full-scale and intensive ICT use (Jones, 2006). Picciano's (2016, citing Picciano, 2009) model of blended learning shown below in Figure 1 below brings the continua of face-to-face instruction and technology use together.

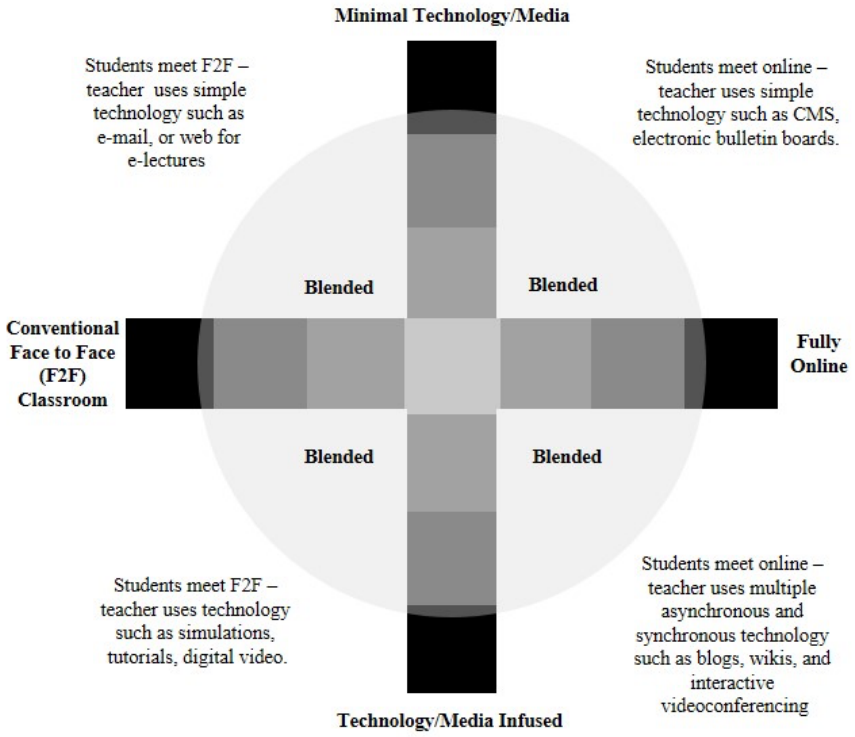


Figure 1: Picciano et al.'s (2016) model of blended learning

More prescriptively, Glazer (2012, citing Allen, Seaman, & Garrett, 2007) suggests that blended courses have between 30-79 percent of their activities online, while online courses might have up to 20 percent of their activities in face-to-face mode, and that face-to-face courses can

include up to 29 percent of online activities. At the other end of this spectrum, Garrison & Vaughan (2008, p.5) offer the idea that blended learning could be considered as an approach that contains a 'thoughtful fusion of face-to-face and online learning experiences'. Parameters for defining blended learning might be considered in three ways: (1) a continuum from 'less' to 'more' technology; (2) three 'categories' marked off by level of technology employment; or (3) a 'thoughtful fusion'. There are other models and categories of what might be considered 'blending' – for example any of the three parameters above might still be experienced through other 'modalities' such as mobile learning.

MOBILE LEARNING

While there are debates about whether mobile learning (m-learning) is simply a form or sub-set of other types of technology-mediated learning (Pachler, Benchmair, & Cook, 2010), it has developed its own distinctive streams of research. For Pachler et al. (2010, p.6), m-learning is not primarily about technology, rather it is "about understanding and knowing how to utilise our everyday life-worlds as learning spaces". Sharples, Taylor, and Vavoula (2007, p.225) argue that m-learning involves a process "of coming to know through conversations across multiple contexts amongst people and personal interactive technologies". The mobile ('smart') telephone in particular features prominently in m-learning discourse,[5] especially in relation to how this technology might be incorporated into learning situations (Pachler, Cook, & Bachmair, 2010).

In the m-learning literature, small, portable devices are said to provide an affordance for learning (Pachler, Benchmair, et al., 2010; Zaphiris & Ang, 2016) anytime and anywhere (Cochrane & Bateman, 2010). Research in m-learning has also tended to "focus on attempts to measure the efficacy of mobile device-based interventions in terms of attainment or achievement gains" (Bannan, Cook, & Pachler, 2015, p.939). Distinctions are also made in the mobile learning literature between the physical characteristics of devices and their context of use, and the pedagogical design characteristics of m-learning (Kearney, Schuck, Burden, & Aubusson, 2012).

For the purposes of this study, m-learning is relevant in the sense that the VTC learning management system (LMS) provides online access to students through their portable devices – laptops, tablets or smart 'phones. It is therefore possible that students may 'blend' more than one type of learning in the same encounter. These encounters may be in class, on campus or in a variety of informal settings with everyday life-worlds as learning settings.

5. This is not to underplay the role of tablet devices, however the convergence of various technical functionalities onto smart 'phones and their convenience has meant a wider penetration of the device into learning applications based simply on the number of users.

E-LEARNING, AND ONLINE LEARNING

A third type of technology-mediated learning relevant to this study emerged from the changing face of distance learning as the internet became a leading content delivery and communication platform over the past two decades. The inconsistent use of terms like distance learning, e-learning and online learning was noted by Moore, Dickson-Deane, and Galyen (2011) in their review of the three terms, leading to possible confusion or difficulty in providing analytical clarity for researchers. A simple and straightforward definition of e-learning might be "technology-based learning in which learning materials are delivered electronically to remote learners via a computer network" (Zhang, Zhao, Zhou, & Nunamaker, 2004). This definition does not include what some posit as a critical aspect of e-learning: "its capacity to support reflective and text-based interaction, independent of the pressure of time and the constraints of distance" (Garrison & Anderson, 2003, p.56). The key here is the capacity to facilitate meaning and knowledge construction through communication between faculty and student[6] where they do not meet physically in the class room.

There are several overlaps in terms of the types of tools used in the educational design of the blended learning program under study and those employed widely in online and e-learning. In particular, the VTC LMS includes a large number of learning objects that may be accessed outside of class hours remote from any class room (simple delivery of content). Further, there is an online discussion component within the course that counts towards the students' final grades on the course. It is within this discussion forum that students may interact without ever meeting, despite the on-campus component of the course (facilitating meaning and knowledge construction through communication at a distance). The substantial body of literature related to online and e-learning around the use of LMS and other tools (for example podcasts[7]) is thus of relevance in this study.

Conduct of the Study

I employed an 'intrinsic case' approach to this study which is explained in Chapter 3 – Methodology (Stake, 2005, p.445). My principal data and data gathering techniques included: (1) observational data in the form of social network diagrams, used to assist students in explaining their learning interactions during the course; (2) observational data of artifacts and material practice, used to enact the practice of blended learning; (3) individual, face-to-face semi-structured interviews with students; and (4) documentary evidence: students' text-based interaction on the Moodle discussion forum, and their LMS activity logs.

6. And between students.

7. There is an increasing employment of video-on-demand casts (Vodcast) in education now, however these were not utilised within this VTC Faculty at the time that the empirical research was undertaken.

This evidence folds into the observational data of artifacts outlined above. Altogether, these data sets reflect the idea of actor-network theory as "a collection of relational and material understandings, concerned with associations between human and non-humans in day-to-day practices" (Thompson, 2012b, p.95).

Thesis Structure

The following is a brief overview of the thesis chapters.

CHAPTERS 2 - 3

In Chapter 2, I review the literature as it relates to the field of technology in education. The review is undertaken using three interpretive frames toward discussing technology and the teaching and learning process and their underpinning assumptions: (1) an *instrumental* orientation to learning whereby technology is conceived as a neutral 'tool' which students and faculty use and with which they interact, (2) *social construction* of knowledge practices - an acknowledgement that technology is shaped socially and in turn, shapes teaching and learning, and (3) a *sociomaterial view* of technology and interaction which is attentive to materialities. Here, albeit not neglected, human agency and perspective are not foregrounded as they are when the focus is social construction.

In Chapter 3, I provide a rationale for my methodological choice of a material-semiotic approach, supported by several distinct and potentially conflicting methods within the study. I introduce the possibility that there are many ways to 'do' material-semiotic studies. In so doing, I explore ontological and epistemological assumptions that have led to my chosen approach. I hold this up as an alternative to the structural analysis offered in the social network analysis discipline, and as an alternative to the production of taxonomies; learning models; or classification schema (as discussed in Chapter 2).

CHAPTERS 4 - 6

The body of my dissertation contains three chapters that explore the varying practices of blended learning, accenting at times human participants in these practices and at times 'more than human' (artifactual) participants. In Chapter 4, I consider how the practices of blended learning on and off campus are inter-twined in social and ongoing interactions (Wenger, 1998). I identify small social groups of learners forming that have features in common with learning communities (Lave & Wenger, 1991). I examine a variety of configurations that emerge when students engage with one of the central technologies featured in the course design – the discussion forum in Moodle. I detail how movements of time, space and place

characterise blended learning in practice. In Chapter 5, I extend my examination of how learning networks are formed through a heterogeneous mix of actors – human and non-human. I explore how different mixes of technologies 'perform' blended learning practices. I characterise the learning of these students as an ongoing process of "performative materialist enactment" (Mulcahy, 2016, p.90). In Chapter 6, I turn to actors in the broader learning assemblage including: Faculty staff, institutional technologies, and 'outsiders'. I show how each contributes as an authentic participant in the situated learning context.

CHAPTERS 7 – 8

My final chapters conclude the study. In Chapter 7, I explain how the employment of particular heuristics has enabled me to both visualise and articulate what I have learned in the study. To provide insights into the ways in which sociomaterial practices bring the reality of blending learning into being, I have created several visualisations of blended learning that I have designated 'practograms'. These visualisations have enabled me to illustrate a sociomaterial view of blended learning, along with a series of hybrid learner-identities that relate to particular, contingent and localised practices shown in the study. I go on to explore embodied and digital 'doing' as hybrid engagements, and how we might see a place like the library 'performed'. I conclude that multiplicity and fractionality (Law, 2004) enable us to explore perspectives with regard to blended learning that invite consideration beyond the instrumental and, to some degree, social constructivist view of technology, teaching, learning and the student experience. In Chapter 8, I provide conclusions that I have drawn from the study that have implications for how we view learning in a technology blended environment within a setting like that of VTC. I do this by using a scenario-building approach, rather than a prescriptive set of recommendations. The scenarios offered provide suggestions for how blended learning designers might allow for the hybridity of practices to improve opportunities for students to learn in both embodied and digital encounters on-campus and online.

Chapter 2

Literature Review

While the literature on technology in education extends back considerably and has broad reach, contemporary researchers offer a cautionary note that it is important to frame research in this area "by looking closely at particular ICTs as used by particular teachers in particular teaching situations to achieve particular curriculum or learning goals with particular students" (Ham, Gilmore, Kaschelhoffer, Morrow, Moeau & Wenmoth 2002). As a participant in and contributor to the field of technology in education, I am conscious of an emerging contestation of discourses in the educational technology literature. There is an attraction to using new and advanced technologies that offer the promise of more useful, perhaps powerful, ways to teach in a more constructivist or more stimulating way (Holmes, 2009; Lonn & Teasley, 2009; Ruth & Houghton, 2009). The early conception of ICTs as a metaphoric 'Trojan horse' (Hinostroza, Mellar, Rehbein, & Preston, 2000, citing Olsen, 1988) is suggestive of technology in education being a useful but stealthy way to bring about pedagogic change in the classroom. Recently other themes of direct relevance to the study in hand have emerged in the literature suggesting: gaps in the expectation of the student experience – what the student thinks can be delivered via the technology and the experience itself (Holley & Oliver, 2010; Henderson, Selwyn & Aston, 2015); reservations about the merit of viewing learning interactions as 'community building' (Overbaugh & Nickel, 2011; Postma, Seugnet Blignaut, Swan, & Sutinen, 2013); and reservations about the experiences of the practitioner and his/her ongoing intentions to continue the use of certain learning technologies (Lee, 2010).[8]

In its turn, the academy has offered a critique of the emergent body of research on blended learning. For example, in the context of business programmes, Arbaugh, Godfrey, Johnson, Pollack, Niendorf & Wresch (2009) raise the following issues: (1) a lack of sharing of analytical approaches between business disciplines resulting in wide quality variances between disciplines; (2) a lack of awareness of theoretical perspectives and conceptual frameworks that could be transferable between disciplines; and (3) a lack of evidence to guide administrators wishing to make decisions about designing business programmes.

8. Further, Neil Selwyn asks us to challenge the 'hype' around educational technology (Selwyn, 2014a) and to 'distrust' certain technologies like 'virtual', 'open', or 'social' (Selwyn, 2014b).

Review Outline

This chapter is structured in three main parts. The initial section will cover established approaches to studying human-technology interaction with a particular focus on blended learning activity. Initially, I explore common research approaches to studying the human-technology relationship. Several examples of research into student learning-technology interaction are presented in order to illustrate a kind of 'engineering' approach to blended learning where fulfilment of certain conditions will lead to desired outcomes. With regard to human-technology interaction, these studies maintain customary divisions between the human subject and material object. Here, as Wise (2011, p.95) claims, human and technology are separate and "act on one another". Commencing with structural analysis, I explore how learning 'networks' are being examined for a variety of purposes, such as identifying students at risk of academic failure. Moving from structural analysis at the 'group' level, I then examine studies at the micro level of analysis of practices (Knowlton, 2005). The student-technology interaction construct is then introduced. Here, scales are applied to determine levels of student engagement (Chen, Lambert, & Guidry, 2010) and 'using' technology becomes an indicator of engagement.[9] Throughout this section, the ontological separation of human and machine is maintained.

In the next section, the social constructivist view of technology is introduced. Here, technology is considered to be socially constructed. Informed in part by notions of social structures and human agency, technology is taken to both shape social relations and be shaped by them. Garrison and Anderson's (2003) widely-adopted Community of Inquiry (CoI) model – used to conceptualise the practice of blended learning – is examined in this section. The concept of learning communities is also examined (Lave & Wenger, 1991).

In the third section, emerging approaches to studying the human-technology relationship, which derive particularly from actor-network theory (Latour, 2005; Law, 2009a) are considered. Here, technology is studied in all of its heterogeneity – a disparate mix of elements is taken into account. Studies concerning the co-constitution of technology, learners and learning via socio-material practices are explored. These studies centre on concepts such as: the learner assemblage (Aberton, 2011); the co-agent (Michael, 2004); and the socio-spatial flow of action, people and objects (Nespor, 1994). The section concludes with examples that extend beyond views of learning entailed in the approaches outlined above, to take in the daily material practices that connect people and things in networks (Thompson, 2012b).

9. Student engagement is a contested concept. In an over-arching sense, it might be concerned with broader, perhaps institutional-level concerns (for example the 'National Survey of Student Engagement' (Kuh, 2009)) or at a more granular level, with gaining insights on a particular learning activity in a course of study (Wang, Bergin & Bergin, 2014).

Section I: An instrumental 'technology-as-tool' orientation

The received view of online and blended learning is a view that "posits the human (learner) and the technological (learning *online*) as specific things that are completely different and that could act on one another" (Wise, 2011, p.95). Studies that are guided by this view seek to explain how humans and technology in education intersect using a variety of schema, learning models or taxonomies that can be 'applied' in practice (or 'best practice').

Underwriting this view, a metaphor used to explain the nature of technology and education at a general level is that of the Trojan horse (Hinostroza et al., 2000). This evokes thoughts of using technology to help 'deliver' a pedagogical outcome – as a tool – in the teacher's 'armoury'. Many of the studies described in the following section are pedagogy-led. There is no doubting the helpfulness of these studies in furthering the field in their particular contexts. What remains common is their 'outside-in' approach – driven by functional outcomes, variables to be operationalised, constructs to be tested, correlations 'identified', or interventions to be 'manipulated' (Graham et al., 2014).

OBSERVING TECHNOLOGY-MEDIATED INTERACTION FOR 'DIAGNOSTICS'

One of the disciplines having some influence in the field of understanding student interaction with technology is that of social network analysis (SNA). To the scholar of social structure, SNA provides an opportunity to view the use of discussion forum technology as an exchange of messages. Central to SNA are constructs such as reciprocity and density which provide the researcher with a 'top down' view of the communication network showing participants as 'nodes' in a network. Application of the technology can provide the teacher with 'analytic' power to 'see' the learning network (Dawson, 2010; Stevens, 2013).

At the 'networked' level, Macfadyen & Dawson (2010) reviewed the discussion forum transactions of 118 students undertaking courses of study in biology at the University of British Columbia. The purpose of the study was to develop a case for using SNA as a diagnostic tool to identify students at risk of failure or 'drop-out'. The data provided the authors with a ready-made diagnostic tool that could highlight individuals who might be left out of important learning interactions, or others whose social position could be beneficial to their peers in the network (for example by introducing a better socially connected student to an isolated one in some way, either formally or informally). The development of a number of sociograms (Moreno, 1953) at various stages of the course led to observations about the consequences of different network structures. It was concluded that high performers were more likely to be found at the centre of the network.

Structural analysis has a long tradition dating back to early observations of social interaction of various kinds – including the observation of school children during play time (Bott, 1928; Wellman, 1926) – and has progressed from the early sketches of Jacob Moreno, to a new branch of social science that has been harnessed to understand 'small world' concepts. Extending the intuitive grasp of the early pioneers, Bavelas, (1948, 1950) developed structural equations to allow for the application of very specific rules about where actors in a social network appeared (for example, individuals in a network who are more socially distant appear further apart on the sociogram). This was further extended by Linton Freeman in 1987 (Freeman, 2004) to enable specialised computer-based programmes to easily display networks (sociograms) graphically. This has led to a substantial body of work dedicated to understanding the meaning of social ties and, as has been described above, to developing a learning diagnostic in an online discussion setting. The metrics of conversations and relationship dyads and triads are used to identify those who may be isolated in a communication network, those who may be insular (in cliques) and those who, by virtue of their 'central' status, occupy the hub of a given social network.

Methodologically, Freeman's (1987) developments have offered the capacity for unique forms of quantitative data to be combined with a qualitative output, used by the researcher to draw conclusions about particular individuals identified through their online transactions and 'social position'. In this particular case, students on the 'outside' are said to be more likely to achieve lower scores, and those placed centrally, higher ones. The diagnostic value is taken from the affordance of the technology which offers the teacher greater visibility of those who might be struggling. This means the teacher might choose to intervene and either redirect the student into a mentoring relationship, or to take direct action in the teaching and learning process.

An early attempt to improve student learning using feedback from discussions can be seen in research relating to text-mining (Hsu, Chou, & Chang, 2011). With the aim of improving the responsiveness of a discussion forum system's feedback to students, the researchers developed a set of algorithms related to Bloom's (1956) taxonomy. Using templates relating to differing semantic relationships of discussion forum posts to the taxonomy, and by parsing discussion data through text-mining software, they constructed a 'cognition circle' showing each participant how their individual contribution varied from lower level (knowledge indicator) to higher level (evaluation indicator) outcomes.

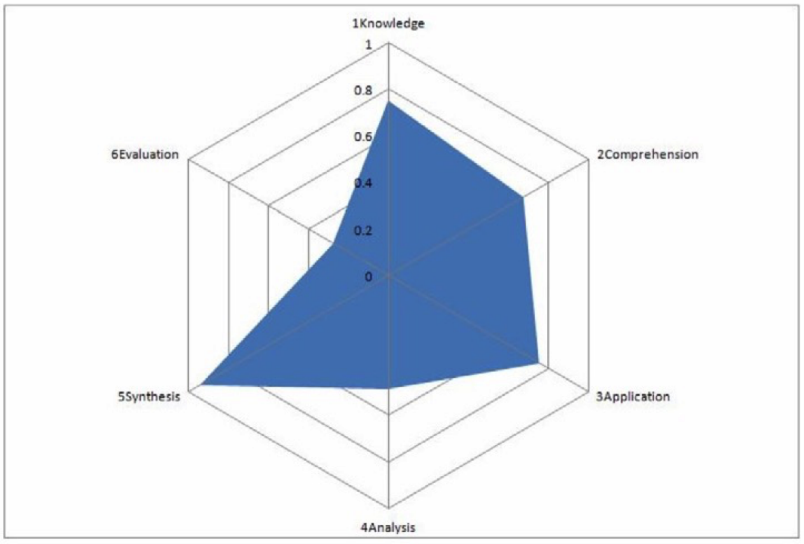


Figure 2: Hsu, Chou and Chang's (2011) Example Cognition Circle

In order to provide formative feedback to students, the software developed a 'collective' cognition circle which was offered to individuals to compare with their own outcome (circle) from the discussion. The cognition circle was generated via an application called 'Eduminer'. The research involved 56 graduate students at a university in Taiwan enrolled in a course of study in human resources management. Participants were from 14 work groups, each of four members, with an experimental design involving seven control groups and seven experimental groups. The experimental groups were provided with feedback about their forum contributions through their individual cognition circle, while the control groups were not.

Participants discussed open-ended questions on a controversial issue using the Discuz! platform. A total of 460 posts were analysed that were generated over a 4-week period. The validity of the Eduminer software was established by using two independent 'raters' who reviewed 274 items and provided their scores based on the taxonomy. Hsu et al., (2011) argued that in comparison with the control group, the experimental group's results in certain higher-order thinking (analysis, synthesis and evaluation) suggested a statistically significant difference in performance for the better (Hsu et al. 2011, p.3437).[10]

While the value of being able to see individual progress in a discussion is apparent from the study, the level of analysis concerning an individual's learning from discussions in this case related to broad taxonomy-based constructs, rather than a more granular examination of individual learning. The authors also reported that individuals in the experimental group

10. It is noteworthy that the key categories underpinning this research are *pre-specified* and values are ascribed to student performance. A sociomaterial practice perspective in contrast would gather information on these categories and values *in situ*; as they emerge in 'real time', that is, in and through the discussion.

"did not strongly appreciate" the comparison offered between their personal results from discussion contributions and that of the 'collective' cognition circle.

Tools like Eduminer have potential to assist teachers when reviewing a discussion forum, as Dringus & Ellis, (2005, p.157) point out: "postings to a single topic can run into the hundreds, span several weeks, and represent many types of contributions". Studies of this nature continue to attract attention in the literature and now include a combination of the two concepts described above – learning analytics (Wise, Zhao, & Hausknecht, 2013) and social network analysis with feedback for formative assessment (Lin & Lai, 2013).

ONLINE DISCUSSION AND TECHNOLOGY INTERACTION: TEACHERS AND STUDENTS

An early attempt to develop a taxonomy of instructor forum postings offering classifications was undertaken by Blignaut and Trollip (2003). They reviewed instructor postings in an online discussion forum and created a taxonomy of interactions, characterising them as: administrative; affective; directive and procedural. Later, drawing on the constructivist literature, Knowlton (2005) developed a taxonomy of learning through asynchronous discussion. Describing interaction in online discussions as a matrix built on views of the environment, collaboration, and knowledge construction, the author proposes a continuum of classifications that can be used to frame individual participation. The question posed by the author is: "What types of design structures and facilitation can help participants move from lower to higher levels of the taxonomy?" (ibid., p.172).

Studies of this nature seek to set the agenda for research in using observations of student interactions with their learning technology, in this case within an online discussion forum. A functionalist perspective on the technology-human relationship is adopted, for example: "A central argument underlying this article is that description is needed prior to the development of more carefully considered instructional prescriptions for asynchronous discussion" (ibid., p.171, emphasis added).

		OBSERVATIONS BASED ON SELECTED TENETS OF CONSTRUCTIVISM		
		Learning environment	Collaboration	Knowledge construction
Learner participation/view	**Passive**	Might be thought of as a 'lurker'; seems to be on the 'outside' of discussion	Possibly overwhelmed by expectations set by teacher; possibly collaborating through other media	Sees knowledge as something constructed by others; prefers not to share their own knowledge construction process
	Developmental	Takes forum to be more a place for informal or novel interaction rather than educative	Mainly reactive to posts of others; sees forum as something that helps to build community or 'belonging'	Limited views of capacity for asynchronous discussion to construct knowledge; does not share their own thinking process in contributions, only final 'product'
	Generative	Uses forum to 'report' back their knowledge to the instructor; sees the environment as teacher-centred	Forum postings use monologue approach which may be influenced by traditional academic model which is connected to earning a grade; starts to show a level of communal trust	Organises and elaborates on ideas through their discussion participation but in response to prescriptive set tasks
	Dialogical	Sees environment as an opportunity for more durable knowledge construction through collaborative effort; takes advantage of the asynchronous environment to reflect on others' contributions	More appreciative of reciprocal nature of interactions between individuals; seeing and sharing different perspectives of other participants suggests collaboration might be seen as 'collective thought'	Reviews, revises and tests ideas encountered in their discussions and expands and develops on these through further discussion with others; full interdependence
	Metacognitive	Uses the environment to learn about themselves, making a personal transformation through considering their current and previous perspectives	Takes the opportunity to find out how others understand texts or assignments and considers this with respect to generating and monitoring their own knowledge; 'sizes-up' their own role in the discussion to gain more insights about themselves, often introspectively	Appreciates construction process goes beyond asynchronous discussion; appreciates the impact that discussions may have had on their own development; able to reflect on how knowledge developed in discussion might be applied elsewhere on the course

Table 1: Adapted from Knowlton's (2005) Taxonomy

Functionalism (Elliott, 2010) plays out here in the sense that elements of blended learning *fit* together as part of a system of instruction: blended learning is a structure that you can presuppose and perhaps, prespecify. In the case of a learning taxonomy, a scale of learner contributions is offered ranging from 'passive' to 'generative' to 'metacognitive' based on participation and contribution. This rubric suggests a useful way to evaluate production of text with evidence of the learning taking place in the 'system'. Technology here is presented as an affordance for the development of learning practices (or evidence of learning) and the student as someone whose experience is shaped by the tools on offer. Knowlton's work, drawing as it did on learning theories, has set the agenda for further studies into student technology interaction.

Extending Knowlton's (2005) work empirically, Wise et al., (2012) investigated how patterns of individual student behaviour related to his theoretical levels of participation. Their study examined knowledge-production practices by considering how students interacted in a discussion forum, with the aim of providing evidence that they had performed in ways ranging from 'passive' to 'metacognitive'. This is a study of a large undergraduate course in organisational behaviour in a Canadian university offering a blended delivery mode in which 96 students participated. Students were required to join three discussions in 'Phorum', a type of online asynchronous discussion forum.

The authors claim that: "by unpacking data for individual students over time to reconstruct

their experiences participating in an online discussion, the microanalytic approach extends previous work in educational data mining based on aggregate statistics" (Wise et al. 2012, p.109). To do this, the authors took an extreme case approach (Patton, 2002) – they sought data samples that showed large contrasts, such as extremely high or extremely low values in given activities, for example: the number of posts viewed; length of time spent contributing to the discussion; and the number of times students visited the forum. On this basis, they selected five particular cases and reviewed each kind of action in the forum, for example reading a post, scanning one or editing. Using the visual examination of the data exhibited through pie charts of the activity, different profiles of activity for each student were developed including a temporal analysis of participation (for a discussion on the temporal aspects of student behaviour see Downing, Lam, Kwong, Downing, & Chan, 2007), and some initial conclusions were drawn about how the student might 'fit' within Knowlton's taxonomy. The authors' descriptions of their research findings portray a sense of 'reverse engineering' achieved to show how they saw particular students interacting with the technology and their peers:

> Tracey's activity meets several of the indicators for dialogical participation, one of the more advanced levels in Knowlton's (2005) taxonomy. In dialogical participation, learners understand discussions as tools for collaborative knowledge construction and are actively engaged in reading others' ideas and drawing on them to contribute. Tracey spent a great deal of time reading, re-reading, and replying to her classmates' posts in a thorough, systematic manner, indicating that she tried to situate herself in the conversation substantively and clarify her understating through interacting with others. Her multi-pass strategy of reading all posts in sequence then going back to re-read them while using an external tool to compose her ideas also suggests that she valued her class-mates' ideas in formulating her own thoughts, and saw the discussion as a tool for collaborative (rather than individual) work (ibid., p.112).

Held up by the authors as an "on the ground view of student participation in online discussions" (ibid., p.114), the work extends on previous studies by taking a more detailed look at particular cases, rather than making assumptions about what particular individuals are doing as they engage with the material on the discussion forum. Further value can be gleaned from the conclusions of the study through the authors' acknowledgement that two of Knowlton's participation forms were not observed – those at either extreme – passive and metacognitive. Moreover, the authors suggested, in line with Knowlton's view, that students may exhibit more than a single type of participation at any one time.[11] Highlighting the difficulty in applying a taxonomy-led study, the authors pointed out that one of the

11. This issue will be further addressed in the second and third sections of this Chapter.

participants in their study had the highest number and length of interactions in discussion, but further analysis showed participation to be shallow.

In common with Hsu et al. (2011), the authors also recommended that the key to improving participation in discussion is to provide accessible feedback to students about their activity in the forum. They also made a range of practical suggestions including support for Rovai's (2007) prescriptive measures of criteria against which students should be evaluated in discussion forums. Rovai's (2007) work offers a prescriptive approach to facilitating online discussions, including recommendations on: (1) percentages for forum contributions in grading schemes; (2) rubrics for marking discussions; (3) sequences for socialisation and task-oriented activities; and (4) approaches to handling issues such as gender and culture-based communication patterns, and handling 'social presence' as an instructor.

Knowlton's taxonomy has been extended to include interaction 'stances' (Putman, Ford, & Tancock, 2012) spanning cognitive and collaborative continua; and to consider 'listening behaviours'. This includes classifications for the various "ways learners engage with others' posts" (Wise, Hsiao, Marbouti, Speer & Perera, 2005, p.1).

The engagement construct is another that has come to be represented in the literature on student forum interactions, presenting some contradictions in terms, for the researcher. 'Engaged lurking', rather than an oxymoron, is said to provide "an opportunity to highlight the neglected contribution of … lurkers who may only sporadically contribute to the conversation, but quite often make significant contributions when they do" (Chen & Chang, 2013, p.171). In contrast, Dringus & Ellis (2010) suggest that careful attention should be paid in discussions to matters such as monitoring with regard to: scale and sequence; density; intensity; latency and response count. The question of maintaining the health of the discussion is a principal concern for these authors, who make practical recommendations such as the careful monitoring of peaks and troughs to get a sense of engagement to gauge discussions' 'health'.

Several studies examine the issue of students' overall engagement with discussions, Hewitt's (2005) being illustrative of this interest. He found that across an 18-class undergraduate study course, the average topic thread in a discussion contained only 2.2 notes (a post and a response). He suggests that "limited thread growth appears to be a persistent and widespread problem" (p.569). After a careful review, he concluded that one of the main reasons behind 'thread death' was the activity pattern of students as they pay attention to 'unread posts' on login (which he described as "single pass practices" p.576). Altogether, he argues that "the quality and value of a given thread, as a whole, is not necessarily a good predictor of future growth" (p.580). This is as a result of a 'rich-get-richer' dynamic

which in this study meant that threads with many unread posts tended to get the attention, while others – potentially containing important concepts or material – might slip "out of the communal spotlight" (p.580).

Other contrasting studies suggest interaction as a construct *can* be indicative of student engagement. In their study of 'engaging online learners', Chen et al. (2010) rely on scales provided by the National Study of Student Engagement (NSSE) to examine, amongst other things, any relationship between the amount of technology employed on a course and student engagement (p.1223). The study measured a wide range of e-learning and online educational technologies using self-report surveys that included carefully designed indicators of student engagement based on their personalised outcomes (for example: gain in general education; personal and social development; and gain in practical competence) and 'Benchmarks of Effective Educational Practice' (for example, level of academic challenge; active and collaborative learning; and student-faculty interaction) (p.1225).

The views described in this section are exemplified by Khine, Yeap, and Lok (2003, p.116) in their discussion of computer-mediated communication (CMC), when they suggest that "while CMC encompasses uses of technology, technology is not the central issue in communication. The important issue is the quality and quantity of communication that the use of technology brings about". Technology is, as it were, reduced to its capacity to bring communication about; it is conceived as functional. The separation of machine and human described above contrasts with the socially constructed view of technology explored in the next section.

Describing a universe of things, people and connections

Another set of views that maintains the primacy of human agency seeks to include technology as a node in the learning environment. Structural analysts, dominated by humanist perspectives over the past five decades, are turning to the materiality of their networks to enhance their understanding of the emerging structures. Extending on their substantial body of work in social-structural analysis, Contractor, Monge, and Leonardi (2011) theorise ways in which technology can be brought into their analysis of interaction in organisational settings. In their recent review of the ongoing development of social structural analysis, they suggest that scholars in their discipline began exploring new ways in which technology enables and constrains communication some time ago. They observe that "technologies can simultaneously shape and be shaped by the social structures into which they are introduced" (Contractor et al., p.683), holding the position that ontologically, these studies maintain that "technologies exist separately from people's social networks" (ibid., p.683). What is interesting about this line of inquiry is the way in which Contractor et al.

(2011) chose to alter the direction of their studies, and how they would alter their analysis of human-technology interaction by departing from their own intellectual tradition:

> This move implies that researchers can no longer make an analytic distinction between technologies (or artifacts more generally) and people. They must begin to recognize that networks can be comprised of people and technologies, and that both types of nodes may, on occasion, play equivalent roles. Recently, proponents of a sociomaterial approach to studies of technology and communication have begun to provide us with the ontological foundations and theoretical language with which to make this conceptual shift (ibid, p.684)

Despite this acknowledgement, they continue to theorise material and human elements as separate nodes in a structure. For Contractor et al. (2011), and for further work influenced by their turn to the socio-material, see Jarrahi and Sawyer (2012) and Pentland and Singh, (2012). The empirical extension of their work manifests in multi-dimensional networks that include hardware and other non-human items (see Figure 3 below).

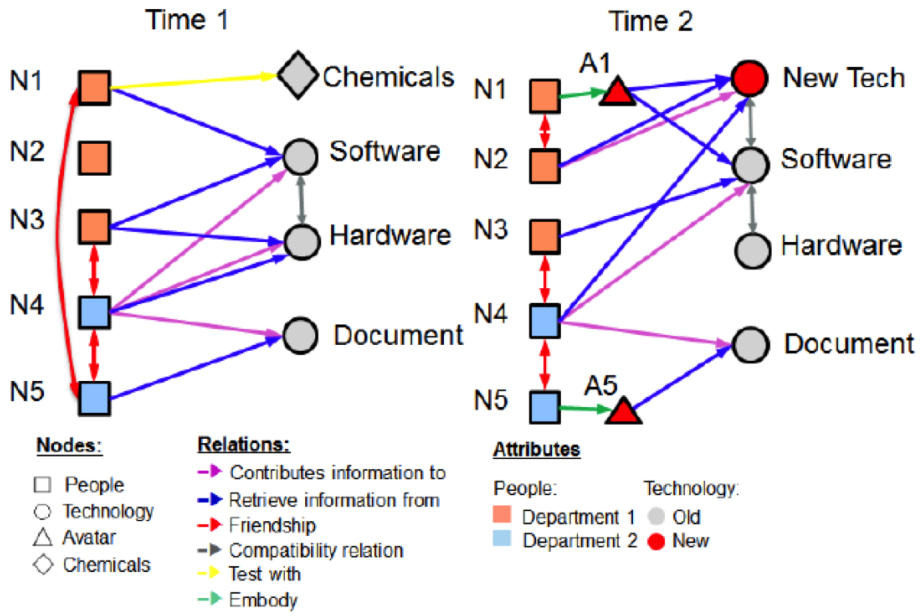


Figure 3: Bringing technology 'inside' the network (Contractor et al., 2011)

This perspective on the structure of human-technology relations and social interaction has its parallels in the educational literature. For example, Barab, Hay, and Yamagata-Lynch (2001) describe a network approach as one that captures "the distributed and situated nature of knowing in the making" (Barab et al., p.69). Drawing on (1) Activity Theory, (2) network approaches; (3) interaction analysis and (4) 'tracers', the authors posit a model that results in an analytical graphic they term *action relevant episodes* (AREs) – see Figure 4 below.

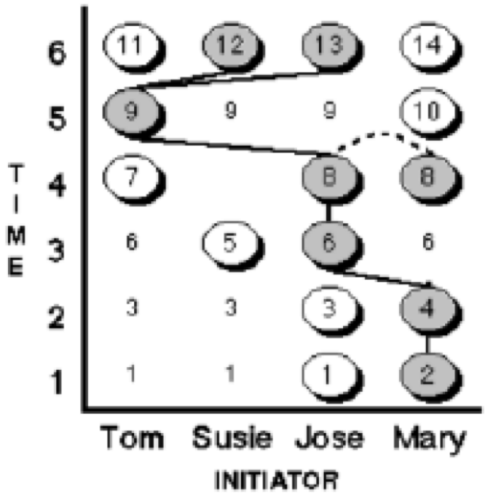


Figure 4: Barab et al.'s (2001) Action Relevant Episodes

Though they suggest that their process has overlaps with actor-network theory, they reject the concept of analytical symmetry and state that: "although we may follow the trajectory of a nonhuman artefact or even examine the relations of a nonhuman artefact and a particular understanding, in our conception only humans are coded as actors" (ibid., p.71). Their AREs are considered to be ethnographic chunks, useful for following and understanding the interactions between individuals working on learning tasks in mediated communication environments, such as a learning management system. Adopting a similar approach, Suthers, Dwyer, Medina, and Vatrapu (2010) analyse the interaction of two collaborating students as they are traced through an online discussion (see Figure 5 below). Each of these analytical approaches attempts to capture fine detail including: (1) the protagonists; (2) any form of technology they were using; (3) their detailed comments or products; (4) the temporal continuum of the interaction(s).

The preceding section illustrates the conception of technology acting as a 'tool' that can be used in a functional way to facilitate learning and teaching. The inherent features of various types of technology (for example hardware) and how it is configured to operate (for example software) serve learning designers, students and teachers through various applications. In the following section, a view is explored that accounts for more of a co-constructed outlook on human-technology interaction.

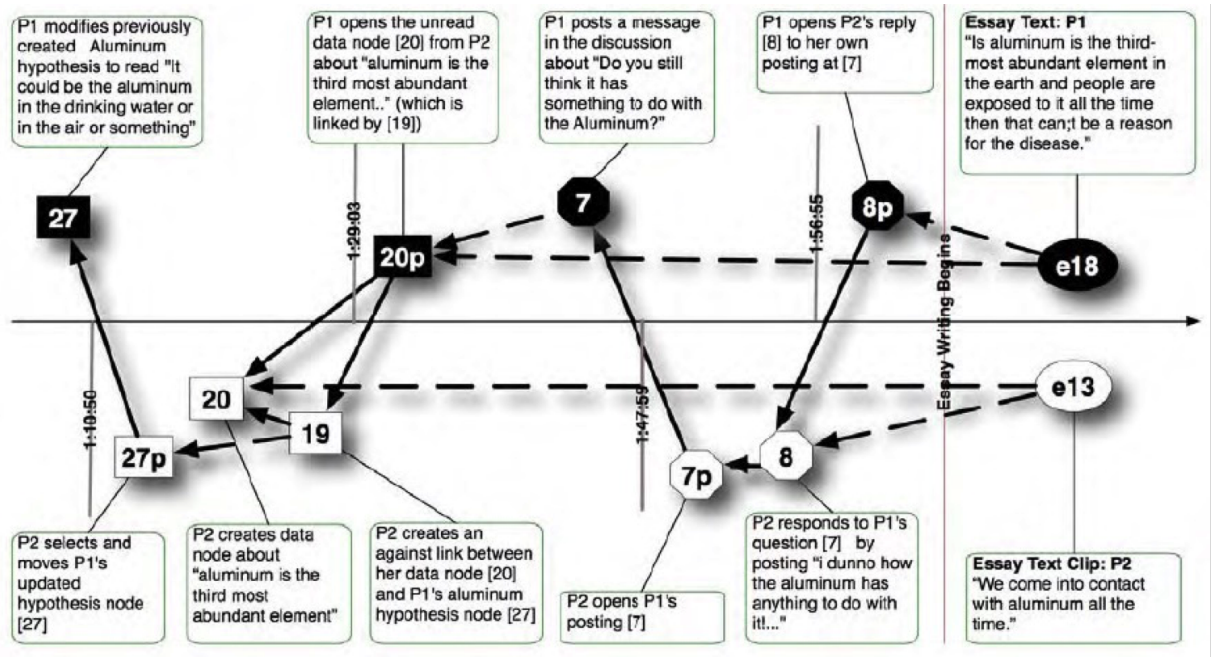


Figure 5: Suthers et al.'s (2010) Contingency Graph

Section II: A social constructivist view: Students in the blended learning context interacting with peers and technology

A move to reflect the idea that technology is socially shaped as well as socially shaping (Buckingham, 2008 citing Williams, 1974) suggests a turn to the 'constructed' nature of knowledge practices in the literature. Indeed in his review of e-learning and the characterisation of asynchronous discussion as a form of 'rhetorical space', Locke (2007) explores Ong's (1982) concept that technology can shape human thought processes both directly and indirectly, claiming that:

> technology, then, is more than just an aid to learning. It shapes the cognitive processes that underpin learning. Furthermore because the uses of technology are culturally mediated, technologically mediated learning (via asynchronous learning networks) is necessarily shaped discursively by the practices around technology privileged in a particular cultural milieu. We inhabit a text saturated world, which we negotiate via a repertoire of textual practices that are at once cognitive, social, and themselves technologies (ibid., p.181).

Taking the temporal and historical dimensions of 'digitally mediated cyberspace' into account, Locke (2007, p.180) asserts that technology is not a neutral conduit and that it is itself "shot through with the very ideologies of identity and power" (citing Payne, 2005). Drawing on

Gee's (1996) discussion of how *socially produced space* influences discourse, he suggests visitors to a discussion forum are entering a "space that is value-laden and, for some, potentially intimidating" (Locke, 2007, p.181). Socially-produced space, membership and connection have each been introduced to the discourse of online learning using the metaphor of 'community'. There is the suggestion that the community metaphor has 'resonance' within educational environments (Schwier, 2002; p.68), and as suggested by Hoadley (2012, p.295), "the ties between technology and community of practice run deep".

In the work of Lave and Wenger (1991) and Wenger (2000), the idea of communities of practice was put forward toward describing the situated nature of the people and the context in knowledge practices. Learning is thought not to be a property of individuals but a relational property in context and interaction with others. A process-based view suggests the practice of "knowledge generation, application, and reproduction" (Hoadley, 2012; p.290) provides the opportunity for individuals to join and identify with particular groups, gradually moving from the periphery towards the centre, engaging in the practices and identity of the group (Hoadley, 2012). However, the reality of 'community' in an educational sense remains contested: Hughes, Jewson, & Unwin, (2007, p.69) argue that Lave and Wenger (1991; 1998) draw uncritically "on the notion of community as a symbolically constructed sense of belonging". Oliver (2010, p.37) suggests that using the term 'learning community' masks reality and that classes really are only "a cohort of students", and that it is "neither warranted nor likely to improve learning [to consider them a community]". He argues that in doing so, we are ignoring negative aspects of community such as "control, exclusion, policing, [or] hostility".

Despite this, the notion of community has been taken up extensively in the literature in a variety of contexts including: (1) a graduate management of information systems course (Waters & Gasson, 2007); (2) students' approaches to the learning task (Garrison & Cleveland-Innes, 2010); (3) application of the Community of Inquiry model in a health sciences education context (Carlon, Bennett-Woods, Berg, Claywell, LeDuc, Marcisz, Mulhall, Noteboom, Snedden, Whalen, & Zenoni, 2012); (4) teacher professional development (Parker, Maor, & Herrington, 2013); (5) a 2010 Special Issue of *The Internet and Higher Education* (Volume 13); along with (6) some lively debate in the academic community (Akyol, Arbaugh, Cleveland-Innes, Garrison, Ice, Richardson & Swan, 2009). Garrison's Community of Inquiry (CoI) model, an influential one in studies on learning communities, constitutes the 'educational experience' as consisting of four elements that encompass a broad context: three presences: cognitive, teaching, and social; and various types of engagement that interact to set the climate, support discourse, and regulate learning (Garrison, 2017 (see Figure 6 below); Akyol, Garrison, & Ozden, 2009).

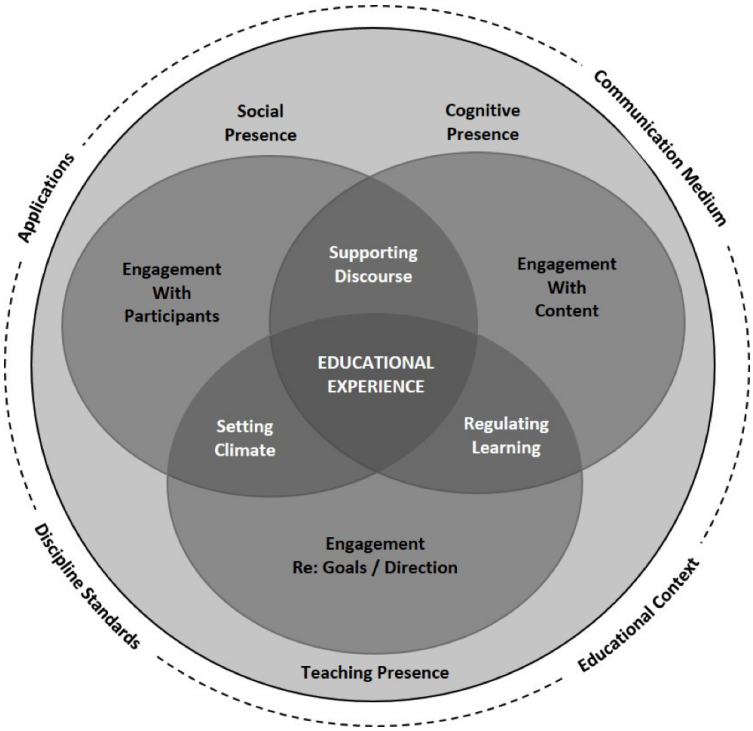


Figure 6: Garrison's (2017) Community of Inquiry model

MANAGING MULTIPLE 'WORLDS': REAL AND VIRTUAL

Talking a qualitative approach, a study by Kazmer and Haythornthwaite (2001), followed 17 individuals in their experience of a librarian education programme (LEEP) conducted in an online course with some residential components. They conducted four interviews with each participant over an extended period. The participants were all mature-aged students, mostly with families. The researchers were concerned with exploring all aspects of the participants' experiences, and found that hybrid types of social worlds emerged from the way individuals' activities overlapped as they allocated their time, attention and resources. One of their concerns was also to provide a description of individual activity, steering away from what they characterised as intangible group oriented experience. They further assert that their approach lacked the "affective baggage of the often imprecise term community" (ibid., p.511).

In their discussion of juggling carried out by students to make it possible to complete their learning tasks, the authors explored the concept of creating territory in the home where they could carry out their classwork. Their experience became a 'wrestling' process dedicated to creating private space with family members, after which their attention was still split between the learning task and their home world. Other difficulties included the need to maintain neglected relationships and to prioritise conflicting needs between work, family, study, and 'optional' worlds.

Yet, as the authors report, there are opportunities for some of the varying worlds in which the students found themselves to be of benefit in their studies. As they describe (ibid., p.523):

> Where lines between LEEP and work, home, and other worlds begin to blend, students experience opportunities for mutual benefit. Instead of collisions, synergy develops between what they are doing and learning in LEEP and what they are doing in other worlds. Positive synergies have been seen primarily between LEEP and work, but also with all other worlds. These include the transfer of knowledge from one domain to another and access to a network of others on whom to call for expertise and advice.

Further, the authors go on to describe the way the participants suggested that their experience with LEEP was not a separate online activity, rather it was described as involving the people, experiences and tasks that it comprised and how they interacted with home, work, and friends. It became a question not of how they manage their online world but how they integrated this world into their array of existing worlds. The authors of the study point out that the members of the program were graduate students and that it is likely that they were able to manage the demands of the program through their ability to handle other intensive activities in their life successfully. Importantly in the context of my own study, I note the authors' conclusion that: "it is important to understand the social world is brought into play when people go online and how these social worlds are juggled, integrated, and/or collide with other worlds, off-line or on" Kazmer & Haythornthwaite (2001, p.528).

Another study in which contextual issues were explored is reported by Holley & Oliver (2010). The study was a close examination of the experiences of six students undertaking university studies in the UK. Employing the biographic narrative interpretive method (Holley & Oliver, 2010, p.695), they studied the conditions under which instructor-led notions of learning and engagement are conceptualised, and brought into light factors such as the digital divide and the experience of international students regarding their struggles for access to technology and resources. The study also introduces consideration of expectations of the student before their "forthcoming educational experience" (p.697).

Challenging the existence of the 'digital native' (Prensky, 2001), the study sought to explore students who engaged in classroom and virtual learning environments. Of particular interest is the fact that the researchers also sought students who did not *engage* with each of these modes, in addition to those who did. The study brings a holistic view to the debate by acknowledging: the family context of the particular individuals in the study; their status as international or home country students; their individual abilities to handle technology – but within the context of their prior learning and capability to use technology; their personalised

home and work spaces; and their expectations prior to their learning experience.

What this study reveals is that despite efforts to provide access to online learning materials for widening participation, it was the "traditional 'good' student who thrived" (Holley & Oliver, 2010, p.699). This is put down to the fact that this particular student was able to easily "colonise new spaces for study (at home and online) using principles from his work in industry" (ibid., p.699). In the authors' statement of limitations to their work, they point out clearly that based on the number of cases and the number of courses examined, it would be difficult to generalise results. However, in reading the paper, it is not difficult to imagine other 'at risk' students going through similar experiences elsewhere, and this has the ability to inform future research of this kind.

THE STUDENT 'IS' THE NETWORK: CONNECTIVISM AND PERSONALISED LEARNING ENVIRONMENTS

As the preceding description demonstrates, efforts to become more detailed, multi-dimensional and micro-ethnographic in describing learning, technology and interaction emerge in the literature through structural analysis and its variants. With aspects of constructivism explored above in this review, other theories connecting learning and technology continue to emerge. Proposing connectivism as a non-representational theory, Downes (2012, p.87) describes connectivist knowledge as being "distributed across a network of connections". Connectivist theory describes learning as a process rather than a property – one that is characterised by an individual's response to the challenges of a changing environment – and that learning may reside in "non-human appliances" (Siemens, 2004). Learning is said to be facilitated by nurturing and maintaining connections. The theory is said to be a break from cognitivism and constructivism, though Downes (2007a) suggests that connectivism shares with constructivism the proposition that knowledge is not acquired as though it were a "thing" (Kop & Hill (2008) citing Downes (2007a)). Although connectivism draws on contemporary debates about technology, networks and connections as a process of learning, it is claimed to have no warrant for being treated as a separate learning theory (Kop & Hill, 2008). A recent and more empirically-grounded application of connectivism as a design framework was undertaken in a naturalistic setting by Parry, Baird, and Pedigo (2013), though closer scrutiny of this work reveals it to be a collection of concepts helpful to consider in applying technology to a learning task rather than a systematic effort to fit the learning and teaching strategy to a faithful rendition of connectivist principles.

An extension of the constructivist approach to learning and technology interactions is emerging in the debate about the 'networked student' and the 'personalised learning

environment'. Given the ubiquitous, mobile and learner-focused nature of recently developed learning technologies and applications, it is not surprising that research is emerging in these areas. Important themes include: (1) individual appropriation of technologies into the learning situation (Cook & Pachler, 2011); (2) bridging the gap between institutional technology provision and technology available in the open access market (García-Peñalvo, Conde, & Alier, 2011), including mapping the technology 'landscapes' of learners (Clark, Logan, Luckin, Mee, & Oliver, 2009); and (3) studies into technology-assisted course delivery that can promote self-regulated learning for students (Drexler, 2010).

Drexler (2010) provides an illustration of applying constructivist principles in a networked setting. Data were collected from secondary students across their final three years at a school in the USA. In an attempt to employ networked technology such that the autonomy of the learner was increased, a course was re-designed to allow: (1) increased autonomy in learning tasks; (2) greater flexibility in introducing ICT-based learning applications into the individual's learning environment; and (3) assessment integrated with the particular applications the student had chosen to use in their course work and assignment. The author of the study suggests that:

> Principles of connectivism equate to fundamentals of learning in a networked world. The design of the teacher-facilitated, student-created personal learning environment in this study adheres to constructivist and connectivist principles with the goal of developing a networked student who will take more responsibility for his or her learning while navigating an increasingly complex content base (Drexler, 201, p.374).

Student narratives from a survey conducted with three different subgroups of 15 students at the end of their learning experience were examined with responses being coded to enable the researcher to draw conclusions about positive and negative comments made by the students. The inferences drawn from the survey information suggested variable experiences, not unlike those reported in the study above by Holley & Oliver (2010). Variances in student motivation, their ability to use technology and level of self-direction all appeared to impact student satisfaction with the 'networked' model. Altogether, networked learning is said to be manifested in "personal learning environments (PLEs), or systems that help learners take control of and manage their own learning" (Drexler, 2010, p.370, citing in part Downes (2007b)). The model of network learning informing this study appears to have employed a combination of connectivist and constructivist principles. Studies of this nature provide exemplars for those wishing to understand how technology can be employed in the context of PLEs. Like the structural view of social interactions sketched earlier, the analytical approach and conclusions drawn in these types of studies assist in making observations about

how technology can be harnessed to assist learning. While there is acknowledgement of interaction between and influence across the human and material world, technology retains the role of a supporting node or set of nodes (see Figure 7 below).

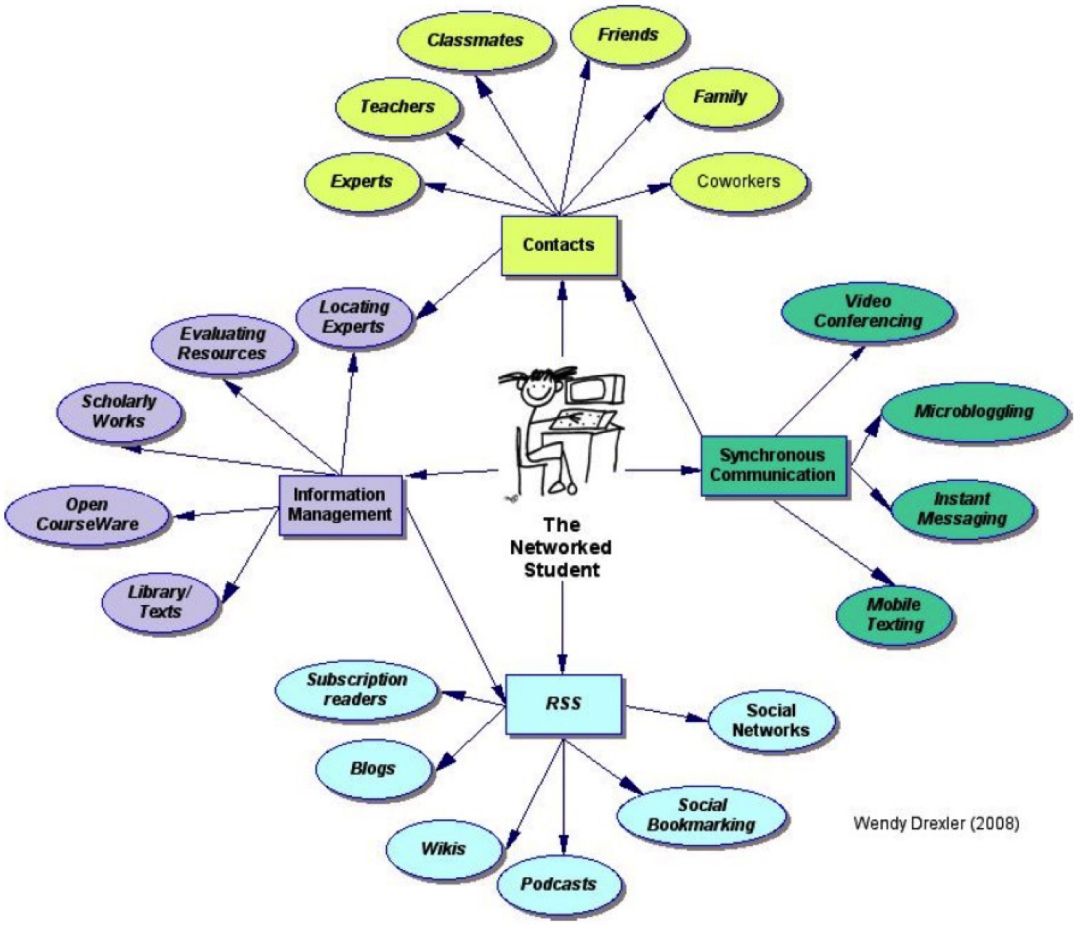


Figure 7: Drexler's (2010) Networked Student

APPROPRIATION OR ENTANGLEMENT?

Cook and Pachler's (2011) study of personal hand-held devices in various settings provides a typology for the description of how individuals use their mobile telephone. Here, appropriation is defined as "the processes attendant to personal practices with mobile devices evolving through interaction, assimilation and accommodation" (ibid., p.155). Many students now access their learning applications through their mobile telephones. Their review concluded that:

> A useful conceptual starting point for looking at appropriation for us was one of viewing it as a socially contingent form of cultural transmission and production, where technology is not some external force affecting society, but rather a phenomenon

constructed, appropriated and understood by society. (ibid., p.155).

A post-structuralist perspective suggests that the interaction, assimilation and accommodation described above by researchers such as Cook & Pachler (2011) can be conceived differently. For example, Wise (2011) suggests that human-technology interactions might be viewed as *articulations*. Articulations are said to be made in concrete practices. Articulation "is the idea that different elements can be connected (articulated) or disconnected in order to create unities or identities" (Wise, 2011, p.97). This is an analytical distinction "purposed" to show hybridity in human-technology relations. For example, Thompson (2012c) describes the complex relations that form in a learning community through the various practices centred on the 'delete' button and Michael (2004) describes the interaction of technology and culture that gives rise to the 'couch potato' through the combination of: a sofa; television; remote control; and person. Neither technology nor human is 'a singular or stand-alone entity; each is implicated in the other. This intra-action (Barad, 2007) brings me to a point of departure in this review, perhaps in concurrence with Pentland and Singh's (2012, p.287) suggestion that: "lately, social scientists have been struggling to bring materiality back into our work".

The preceding section departed from the idea of technology and human 'separation' and accounted for the 'constructed' nature of learning and technology in complex, networked environments. The discussion explored diverse ideas including those suggesting the emergence of the 'personalised learning environment'; 'connectivism'; and the metaphor of community. Many studies of this type include a wider perspective of the learner and their environment. They do, however, remain distinct from the relational view of technology and learning alluded to briefly above and to which I now turn.

Section III: Socio-material accounts of interaction and technology

The socio-material approach to the analysis of knowledge practices has been deployed in a number of different learning settings and contexts. Frequently, studies involve the examination of informal or on-the-job teaching and learning. Orr's (1990) study of photocopy repairers working for Xerox is illustrative. The motivation for the research was a 'close-up' study of how work 'gets done' by observing practices (Orr, 2006).

Contrary to the cognitive view that knowledge is something residing within individuals, Orr (1990) suggested that it is a relational property. Here, knowledge emerged as the Xerox technicians learned through the sharing of stories about problem-solving only made explicit in the context of particular problem-solving practices. Knowledge is claimed to be a "relational property of individuals in context and in interaction with one another" (Hoadley, 2012, p.288).

This proved to be different to the perceived (perhaps received) view of the management of the organisation as the work was designed to be done by technicians engaging with the repair manuals (texts); standard procedures; and previously acquired 'technical' knowledge provided through their training.

Specifically in an educational setting, Nespor's (1994) study was concerned with the understanding of actor networks and how these provided an explanation of identity and knowledge practices in college education. He examined the teaching and learning practices in undergraduate management and physics courses in a large public university in the United States. As a starting point, the study took the position that learning is a result of social activity rather than individual minds. Tackling the question of spatial and temporal domains, the study undertook the task of understanding "knowledge practice as interaction with others distant in time and space – a form of interaction pervasive in modern society" (ibid., p.9). Declaring early an alternative position to the structural view of networks, Nespor (1994, p.13) states that "networks expand, contract, and shift consideration over time, and even the most stable and predictable of them are constantly being re-appropriated and redefined by the nature of the flows that animate them". In this view, classes taken become the 'intersection' of different trajectories, such that to understand what is happening in one intersection requires us to "look at the mess that connects it to the other intersections. The logical sense of an event or setting can never be found entirely *within* that setting and event" (ibid., p.22).

What emerges from the study is a variety of characterisations that speak of the transformation taking place in the students of the two disciplines as they 'move' through their courses. Through his fieldwork observations, Nespor was able to demonstrate how knowledge practices impacted on the identity of the students taking the courses. Knowledge practices included interaction with texts, discourses, lecturers, and academic commodities (such as notes). Further he argued that schooling can only be properly understood:

> by looking at how its practices are enmeshed in much more expansive networks. Schooling isn't a mere reflection of 'larger' processes – economic, political, or whatever – nor does it produce (or reproduce) those processes. One part of a network doesn't create another, but lines of connection and the people and things flowing through them are always under stresses, always contested (Nespor, 1994, p.132).

The question of how networks develop through knowledge practices was also examined by Gourlay, Lanclos and Oliver (2015). Their study was set in the context of higher education students' learning in both library and study practices. The authors drew on two studies using interview and participant-generated multi-modal data[12] to explore text production practices.

The multi-modal data were used as stimuli for discussion "grounding the interviews in the specifics of students' day-to-day sociomaterial practices" (Gourlay et al., 2015, p.268).

The learning 'landscapes' produced in the study illustrated a variety of idiosyncratic, complex and emerging networks created by participants. Regular switching between the digital and analogue featured in the data, with digital practices observed as embedded in the material, including embodied needs such as hunger and thirst. A holistic picture of students' study practices emerges, challenging binaries such as user and device, or author and text. By taking a sociomaterial perspective on study practices, the authors were able to reveal "the messy ways in which students have created provisional stabilities by taking up library infrastructures, subverting or misusing spaces, working around the barriers they experience, transforming texts from digital to print and back and so on" (Gourlay et al., 2015, p.276).

While Gourlay et al. (2015) were concerned with wider networks of emergent digital and analogue learning practices, an earlier study by Bhatt and De Roock (2013) examined digital literacy in the classroom from a sociomaterial perspective. They sought to explore literacy as an "embodied social practice" in what they termed the "digitally infused classroom spaces" of today (Bhatt & de Roock, 2013, p.5-6), where students are required to design and develop presentations, write assignments and conduct web-based research. Using video and screen-capture data they sought to combine multiple views of the unfolding activity in class including movements, talk and screen activity. Their study revealed the "ad hoc use of material artefacts and interactions with actors not always in situ; a sociomaterial assemblage extending into multiple spatial and temporal realms" (Bhatt & De Roock, 2013, p.13).

Studies of this kind and that of Gourlay et al. (2015) have many elements in their learning environment that are similar to the study participants at VTC. The tutorial rooms and the VTC library could be described as 'digitally infused'; and the students are split between the 'blend' of classroom, on-campus and home-based study, managing various social and family networks. Other sociomaterial studies in education have addressed topics such as: (1) Massive Open Online Courses (MOOCs) (Knox, 2016); (2) professional learning of rural police officers (Slade, 2013);(3) informal work-related learning in online communities (Thompson, 2012c); (4) women's informal learning in voluntary community organisations (Aberton, 2011); (5) teacher professional development (Mulcahy, 2012); and (6) implementation of computer-mediated instruction (CMI) in a university environment (Nespor, 2011).

What these studies have in common is that they involve searching for unarticulated and material practices: looking "down" at the particular as it has been termed, rather than "up" at the abstract (Fenwick, 2010). The methods involve a range of processes including

12. For example drawings, videos and photographs of participants' learning environments.

observation of patterns of communication; interviews; focus groups; video, sketches, analysis of texts and other types of interactions in the knowledge practices of learners to observe their 'work-net' activity (Latour, 2005, p.143.). In using the term work-net, Latour distinguishes this from the now ubiquitous term, *network*. This is because it has become loaded with meaning commonly related to the development of social networks and communication networks. The idea is to make a distinction for analytical purposes and depart from the common-usage meaning of the term which is used to refer to such common technologies as: the internet, social technologies, and social networks (including the type of analytics described in the first section of this Chapter). As Fountain (1999, p.344) has it, "the metaphor of a network (in actor-network theory) allows one to map what relations are upheld (that is, what is and what is not associated), and to what degree these are upheld (that is what parts are weaker and stronger)". The notion of *network* in this sense moves "away from predetermined categorisations and follows associations to see how these associations do and do not withstand challenges" (Fountain, 1999, p.349).

Emerging from the field of science and technology studies (STS),[13] this and related approaches to analysing knowledge practices (McGregor, 2003) suggests that conceptions of inside – such as classroom and school – and outside – such as home and community are best considered relationally; these seemingly self-contained spaces and settings are actually a relational set of practices and mobilities (Fenwick & Edwards, 2010b). Commenting on these studies, Fenwick et al. (2011, p.135) suggest that "the potential for examining pedagogy as the enactment of knowing locations, rather than simply focusing on individual cognitive gain or collective participation, has yet to be fully explored, not least because knowing location is not necessarily human alone".

For example, in Thompson's (2012c) study of online work-learning practices, the delete button was treated as a participant in the study. Other technological artefacts were included in the analysis such as hyperlinks, avatars, tool bars and so on. The study suggests that the delete button emerged as something beyond a 'tool'. This brings together the idea of a hybrid network in action: "person + delete button + digital device + online digitalia" (Thompson & Rimpilainen, 2012). While an analysis of the 'networked learner' is being undertaken here, the research report provides an alternative account of digital learning practices. Rather than seeking to develop a schematic model of connections and technologies, the approach allows the researcher to consider 'upstream' and 'downstream' effects. For these workers engaged in informal learning, "the unruliness of the web and its reputation for distraction

13. Historically, studies of science and technology examined the way in which knowledge was produced in these fields and demonstrated that it was an effect of the relations that formed as a result of particular interactions that occurred during the knowledge production process itself, rather than through the application of natural or immutable laws and rules (ordering) developed by the scientists or engineers involved (See for example: Latour, 1999; Bijker, Hughes, & Pinch, 1987; Hughes, 1983; Latour, 1987)

were overriding concerns" (ibid., p.355). Thus, a range of observations emerged in the study about deleting practices including: online privacy; filtering incoming information; 'handling' the flow of data; inclusion (not deleting) and exclusion (deleting). The delete button could be taken to serve as either an affordance or an obstruction (Johri, 2014). This one object has reconfigured itself in a set of hybrid practices to create what the author terms 'abruptly divergent assemblages'. As in other fields, sociomaterial studies in education foreground the heterogeneity of actants involved,[14] the interrelatedness of the heterogeneous actants involved and also, importantly, the politics of these involvements. Who is 'in' and who is 'out' of the blended learning networks that develop in college and continuing education?

The Deleuzian 'agencement' (assemblage) is a popular approach to studying fluid, complex and heterogeneous practices in informal learning. An assemblage is a 'becoming that brings elements together (Wise, 2011, p.91).[15] Aberton (2011, p.16) finds an assemblage in women's informal learning that "challenges the hegemony of formal representations of learning". Proposing the term socio-material bricolage, Johri (2014) examined the informal learning practices of engineers as they transitioned from fully qualified new-starters to competent practitioners, concluding that "engineering educators who implement or directly use technology for learning can benefit from developing a more holistic understanding of their interactions with technology and from a heightened awareness of how the social and material are intertwined" (ibid. p.122).

Concluding Remarks

With regard to materialities, it can be claimed that each of the established research approaches contributing to the understanding of blended learning and knowledge practices employing ICT has particular limitations imposed by its ontological position. In the first instance, structural analysis provides some of the tools needed to enable a better understanding of connections in a network of nodes. We can also see an acknowledgment that material considerations must

Bijker, Hughes, & Pinch, 1987; Hughes, 1983; Latour, 1987). Later developments examining (medical) science (and the 'application' of ANT itself as a theory) include studies of atherosclerosis (Mol, 2002) and Alzheimer's (Moser, 2008). Law (2009b) suggests that ANT breaks with studies of science and technology since "material semiotics counter-intuitively assumes that laboratory studies do not exist outside the relations that produce them" (Law, 2009b, p.6) and that "realities and knowledges are not made but done" (ibid., p.6)

14. 'Actant' is an early term used in STS studies (Bennett, 2004). An actant is said to have "sufficient coherence to perform actions, produce effects, and alter situations" (Bennett, 2004, p.355).

15. The concept of assemblage is said to resonate with a sociomaterial approach and denotes the coming together of heterogeneous actants "with agency dispersed through emerging processes of coproduction" (Bear, 2012). However, there are differences between actor networks and assemblages that must be acknowledged. These relate respectively to: (1) Perspective taking and Spatial constructs. It is argued that assemblage as conceived by Deleuze and Guattari (1987) is concerned with future possibilities or trajectories, and that in contrast, actor network theory addresses the question of how heterogeneous actors come together for a particular outcome. Assemblages attend to spatial boundaries and are traced by exploring the emergent form that is co-produced through an 'eventful' or smooth space and/or a 'coded' or striated space (Bear, 2012). This is not to suggest that assemblage is an inherently physical analytic. The concept may also be relevant for the identification of assemblage in policy, organisations or classroom interactions (de Freitas, 2012).

be included in the analysis (Contractor et al., 2011). Constructivist approaches to the studies described above provide an alternative by foregrounding human agency and perspective in educational settings (Garrison et al., 2000). In their analysis, Barab et al. (2001, p.104) conclude in part that "coupling the network story with a more general ethnographic account provides a much richer description of the context in general", but that "we are not sure on the usefulness of simply building networks without an appreciation for this larger story" (ibid. p.104).

Both of these approaches have merit, and they have resulted in significant insights. The structural approach is assisting researchers to gain a better understanding of how students on the periphery of the class social structure (at least as determined by their interactions on the LMS) appear to be at risk of progressing academically (learning analytics). The constructivist approach and its variants are enabling a richer modelling of the learning processes undertaken during student interaction with learning management systems. Both approaches have aided in the development of models that can help conceptualise blended learning practices. In a sense, each approach is leading to a common belief that the human-technology interaction is complex and needs to be understood in multiple ways. Despite this, there is little evidence of convergence in the field, with each extending on its existing epistemological traditions. The material semiotic approach is emerging as another – rather than alternative – position for researchers to take that is focused on practices in and of themselves. The following chapter describes this approach more fully and explains why I have chosen to take it into the study.

Chapter 3

Methodology

> *"The readiest method of illuminating obscure conceptions, maturing such as are crude, lies in earnest effort to make them apprehensible by others"* (Thomas de Quincey, 1863)
>
> *"There is nothing so practical as a good theory"* (Kurt Lewin, 1951)
>
> *"That the same thing can be repeated does not strike me as miraculous, but it does seem to be for all the people who imagine that facts get out of laboratories without the extension of lab practices"* (Bruno Latour, 1983)

In this chapter, I introduce my reasoning for employing a material-semiotic approach, supported by several distinct and potentially conflicting methods within the context of a case study. I introduce the possibility that there are many ways to 'do' material-semiotic studies. In so doing, I explore ontological and epistemological assumptions that have led to my chosen approach. From the outset, I declare my position as a teacher who has employed online learning technologies for the affordances I perceive they provide to me as a practitioner. I also account for the possibility that my methods are a co-production involving my participants, the organisation I work for, the hardware and software applications I access and so on. They are neither neutral nor benign – they create effects (Law, 2004, 2009b). My account is one of many accounts that might be made about how networks of people and things are made and unmade.

Concerning the general nature of knowledge claims about technology and learning, Twining, (2010, p.157) posits that "the ontological and epistemological stance underpinning each approach has implications for the research strategies that are deemed appropriate". I offer ANT as a set of "sociomaterial understandings, concerned with associations between human and non-human actants in day-to-day practices" (Thompson & Rimpilainen, 2012). In doing so, I present this as a way to potentially uncover new conceptions of blended learning that reveals insights into the practices of students in the 'doing' of blending learning. This sets the scene for a description of my methods of data collection and analysis in the final section.

Situating the Researcher

Acknowledging the 'knowing position' of my work provides a start point for reflexivity. But

making a reflexive move involves more than acknowledgement. Establishing the nature of my reality in relation to the participants of the study and increasing the transparency of the analysis that follows "as much in relation to the reader as to the study participants" must be an explicit objective (Medico & Santiago-Delefosse, 2014, p.352). Dwyer & Buckle's (2009) conception of the insider-outsider and the space between influence me here. By declaring my own biases and assumptions, it is possible for the reader to make conclusions about my ethics, subjectivities and knowledge claims. By emphasising the "contingent, partial, tentative and emergent qualities" of my work here (Finlay, 2002, p.226), my intent is to go beyond making a reflexive move as part of a "rhetorical strategy to claim authority and credibility" (ibid, p.226). As a teacher in a particular discipline and a particular academic faculty, the 'doing' of my research and the writing of my findings are not just emergent, but a co-production resulting from my interaction with students; faculty; my supervisors; my family and other members of the wider network with whom I shared my learning (Finlay, 2002).

Adopting the epistemological positions informing the research reviewed in the previous chapter could easily have seen me take different paths. To realise an agency and structure 'way of knowing', I could have examined patterns of social networks that form in the blended learning environment and determined how any individual's position in the structure contributed to their learning experience in that setting. To realise a constructivist 'way of knowing', I could have considered how the individual's perception of their learning experience and their technology interactions shaped their learning experience. To realise a cognitive 'way of knowing', I could have examined how students develop as learners by blending their classroom experience with their learning tasks and their learning technology (see for example the discussion about learning styles in Chapter 2). Instead, I have chosen to utilise the practice-based, materialist methodological approach of ANT to investigate the practice of blended learning and the role and contribution of technology in this practice.

What could ANT bring to *my* table?

With its origins in the quest to generate a better understanding of material practices in science and technology studies, ANT provides me with a sensitivity to what it is I seek to study – blended learning. Blended learning involves a range of human and material worlds, learners, ideas, teachers, smart 'phones, computers, ICT infrastructure, individuals' homes, classrooms, a barking dog,[16] the library, books and many other elements that comprise the extended network of actors. Fenwick et al., (2011, p.117) suggest that ANT is "not a theory of learning and does not identify learning as an individual human attribute". Learning is viewed

16. This non-sequitur appears out of place but its reason for inclusion here will become more apparent later.

more as a distributed phenomenon that emerges through the struggles and negotiations between the human and non-human elements of the learning process. ANT provides a way of recognising multiple ways of enacting reality. It enabled me to come to terms with the many ways in which material practices enact blending learning.

Many of the analyses in Chapter 2 attended to the humanist element of the learning process, where things – computers, texts, furniture, buildings and others – were a background or incidental element. My intent here is not to subordinate the human element of blended learning, but rather to pay attention to the less visible elements: the break downs; the negotiations, the struggles and tensions I can find in practices, and how these human/non-human webs hold together – or how they do not. As (Law, 2009a, p.141) claims, in this way of thinking, nothing has reality outside of the 'doing' or enactment of the web of relations formed by the social and natural worlds. This also provides me with guidance on how I might go about the investigating and the telling of my findings. ANT studies are generally grounded in empirical case studies, providing me with a way to explore the practice of blended learning to include technology and other participants "in a course of action waiting to be given a figuration" (Latour, 2005, p.71). The claim is not that objects substitute for humans, rather that it is a fruitful exercise to explore who and what participates in the web of relations that might form in blending learning. Given my contention that material analyses of blended learning are relatively uncommon, I see great potential for providing new insights into blended learning with all its trials, tensions, and tangles.

Section II – ANT: retrospectively and today

While accounts of the origin of actor-network theory are said to be somewhat arbitrary[17] (Law 2009a), the traces of the evolution of ANT extend back through the work of Latour and Woolgar (1979), who were concerned about how scientific research activity undertaken in a laboratory became documented 'facts'. Drawing on the semiotic ideas of Greimas (1966), Latour and Woolgar explored the messy relations that occur in the production of scientific knowledge and what they characterised as a purification process that occurs between production and publishing. This messy web of relations, they contended, was obscured by the need for the methods to correspond with the established truths. ANT became an attempt to draw out the messy, heterogeneous networks – both historical and practical – that lay behind

17. That is for a temporal account. Intellectual influences are more apparent: ANT sits in the post-structural tradition. Its influences include relational analytics (Michel Foucault), especially with regards to the idea of fluidity and movement, for example that power is an effect rather than something that can be possessed by an individual; translation (Michel Serres); and the rejection of sociological explanatory frameworks about how the individual and the collective (society) are related (Gabriel Tarde). There is also an affinity with Gilles Deleuze and Felix Guattari's (1987) metaphor of the rhizome and investment in the rhizomatic nature of relations that branch and flow, and are in a constant state of emergence or becoming.

the reporting of scientific knowledge. As Law (2004, p.83) describes, in these precarious chains of relations, the links between materials and statements:

> get deleted, pushed into invisibility out-there, in the final product when suddenly all the intermediate steps are made to disappear, and we are confronted on the one hand by a visible fact out there, and on the other hand by a statement in-here that describes that reality and which appears to derive from it.

Soon after Latour and Woolgar's (1979) efforts to establish this alternative approach to empirical studies of science and technology, Callon (1981) describes a "socio-logic of translation" in his study of a French scientific committee's efforts to develop an alternative energy source (fuel cells). Callon explored how problems come to be recognised in particular disciplines of the sciences – or omitted – depending on the type of discipline and its particular research *practices*. Proposing a mechanism ('problematisation') used to explain how decisions get made by committees, Callon suggested that "an initial frontier is traced between what is analysed and what is not, between what is considered relevant and what is suppressed, kept silent.[18] The problematisation carves out a territory which it then cuts off from the outside, forming a closed domain with its own coherence and logic" (Callon, 1981, p.206). This propels consideration of the idea that scientific knowledge is the result of the many *translations* that take place between various social actors, be they people or things (Latour, 1999).

Later, Callon extends his concept of problematisation (defining the nature of a problem and providing an 'obligatory passage point' (Callon, 1981) for those who might seek resolution of the problem proposed) by including three other 'moments' to describe the process of translation. These three moments include a need to: (1) lock other actors into roles proposed by the protagonists (interessement); (2) keep interested groups in line (enrolment); and (3) stabilise the web of relations that "relates, defines, and orders objects, human and otherwise" (mobilisation) (Law, 2009a, p.145).

These four non-linear 'moments' are illustrated in the case study of the decline of the scallop population in St. Brieuc Bay (France) and the development of a conservation strategy by marine biologists. The researchers sought to become a critical part of the solution by defining the problem situation (declining scallop populations) with the interested parties (fishermen, whose livelihoods depended on scallops). In order for the research to be successful, the fishermen needed to avoid certain areas of the bay for the research to proceed (an obligatory

18. This process is evocative of Foucault's discourses that "define conditions of possibility", blocking some webs of relations while making the way for others easier (Law, 2009, p.149).

passage point). Involving the scientific community and the fishermen as part of the process (interessement), clarifying other actors' roles (enrolment) and stabilising the project (mobilisation) proved to be a fragile set of relations that eventually failed when the fishermen entered the experimental site one evening.

The moments of translation (and their failure) are relevant for the study of blended learning and the use of technology in my research. Educational designers employing a 'learning management system' (LMS) seek to present a solution to the 'challenge' of blending learning by offering technical solutions, some of which are taken up by teachers.[19] In a blended learning setting like that of my study, the discussion forum, a compulsory LMS activity might be considered an 'obligatory passage point'. It is a technology that is employed to help students re-present their knowledge in assignments and tests in a physical environment. The alternative analytic of translations as a set of non-linear 'moments' allows me to consider this technology and its role in blended learning in my third data chapter (the discussion forum).

To further illustrate what is happening in networks of knowledge, Latour's (1983) examination of the work of Pasteur showed how the emergence of a vaccine, rather than being a 'discovery' event, is a series of movements between different 'actors' in a non-linear set of relations between: events; microbes; statistics; documents; experiments; Italians; industries; animals; interests. The account of Pasteur's laboratory shows that it became fragmented by its physical location; the extension of his methods from his own to others' laboratories; and the influences and interests of 'industries'. Latour's description of scientific discovery in action served to show that the dichotomies of inside/outside and macro/micro could be challenged by considering 'scientific discovery' as a series of translations. Referring to each of the elements described in this heterogeneous network, Latour suggests that: "every actor you can think of has to some extent been displaced" (Latour, 1983, p.153).

These early iterations of ANT saw the concept of translation as providing a way to dissolve the dichotomy in science, technology and society studies between content, or "inner workings of science and technology" (Latour, 1987, p.15) and its context (society). Translations might be delayed over space and time, or they might be incremental. Translation is neither deterministic nor linear – entities connect in differing ways and forms: forcibly; mechanically; tenuously; durably; or through pretence, persuasion or subterfuge (Fenwick et al., 2011). ANT provided an alternative and productive analytic device that challenged researchers to consider human and non-human entities in what Barad (2003, 2007) calls intra-action and to explain 'how' *relations* (actor networks) assemble *or not*.

19. This is becoming less so, with these conversations driven more by pedagogy than technology in recent debates (see for example, McGee (2014) and Dziuban, Picciano, Graham, & Moskal (2016)).

ANT and Technology Studies

Latour (1987) challenged the 'diffusion' model of innovation as being one that represents a causal explanation for society's adoption of technology or ideas. The alternative explanation – the translation model – suggests that objects are composed and modified as a consequence of a chain of translations or associations (Mulcahy, 2012). Latour's (1987) translation model of innovation claims that technologies are constantly modified by their users. This is relevant to my study because of the nature of personalised learning environments in a multi-modal, multi-platform context that is blended learning. The symmetry afforded by ANT provides me with the analytical stance to be able to consider a wider and more complete set of human and non-human relations to show what blending learning means (and does) in practice.

Guided conceptually by ANT, previous researchers were interested in the way in which the composition of a "technical object constrains actants in the way they relate both to the object and one another", and "the character of these actants and their links, the extent to which they are able to reshape the object, and the various ways in which the object may be used" (Akrich, 1992, p.206).

Extending this work, Law and Mol (1995) took the concepts of materiality and sociality and framed them as a matter of interactive practices, resulting in something that 'goes together'. They argue that "the bits and pieces don't exist in and of themselves. … Machines, people, social institutions, the natural world, the divine – all are effects or products. Which is why we speak of relational materialism" (Law & Mol, 1995). Promoting this more-than-human view, it has been proposed that ANT is not a programmatic theory "but a loose intellectual tool kit or sensibility – something that could help to sensitise researchers to complex and multiple realities which might otherwise have remained obscure" (Nimmo, 2011, p.109). Further, Fenwick and Edwards (2010a, p.xiv) suggest that ANT's "network ontology is particularly useful for enabling rich analyses of contexts, which have become increasingly important in educational analyses of pedagogy, curriculum and educational change".

Adopting this sensibility, it is then possible to consider blended learning as an emergent effect (a network) rather than a "thing out there" (Latour, 2005, p.131). Thinking with actor-network theory, the opportunity presents itself to:

> avoid making a priori distinctions and then making these foundations upon which all other knowledge builds. Distinctions, such as those between the social and the natural, between the material and cultural, the human and non-human, between the technical and the social are all taken to be effects rather than foundational assumptions *(Fenwick & Edwards, 2010a, p.2-3).*

Following Human *and* Non-human Actors

To illustrate the adaptability of this methodological approach, I offer two seemingly banal objects – in this case a door-closer and a delete button – to exemplify the practice of 'following' the actors (Callon, 1986, as explained by Law (1992)). In contrasting 'ethics' and 'method', Law (1992, p.4) suggests that: "to say that there is no fundamental difference between people and humans is an analytical stance", whereby we can consider human *and* non-human – 'thingly power' – or the mingling of human and 'technological artifacts' (Bennett, 2010, p.xiii). In the case of a door-closer, Johnson (1988, p.299 aka Latour) provides a narrative of access, egress, safety, security and several other properties which have been in effect 'delegated' to a non-human. He suggests that "every time you want to know what a nonhuman does, simply imagine what other humans or other nonhumans would have to do were this character not present". His analysis illustrates how a series of humans and non-humans can come to be associated "willingly, under coercion or unknowingly" (Thompson, 2012b, p.96).

Turning the analytical spotlight on learning practices, by highlighting a technological artefact 'in motion' – the 'delete' button of a computer – Thompson (2012b, p.98) suggests several heuristics that enable us to grasp the relational effects of objects: a) following the actors (after Latour, 2005); b) tracing hybrids of co-agents resulting in an assemblage (after Michael (2004)); c) studying the effects of when intermediaries fail, for example through accidents and breakdowns (after Latour, 1992 and Michael, 2000); and 4) untangling the tensions between stability and disruption (the sociality around a given object and how it might reveal contradictions or incoherencies). By studying the practices of learners in online discussions, the 'delete' button is part of the negotiation in the 'making' of the presence and absence of others online. As a study of how actors and organisations mobilise (Law, 1992), *not deleting* becomes an effect of wanting to retain the information or the connection with other actors; not deleting one's posts in an online forum can also result in "bits and pieces following their own inclination and making off" (Law, 1992, p.6) – the growth of a digital footprint and its unintended consequences. Importantly, intentionality is not being ascribed to objects: they are participants in an "action net" (Latour, 2005, p.132).

Developing a Material Semiotic 'Sensibility'

The example of the "delete button" provides a case that helps to explain later development of ANT, or as John Law has characterised it "post-1990 ANT" (Law, 2009a). This extension of ANT as a form of material-semiotic relationality (Law, 2009a, p.146) sees: (1) the human and non-human as a heterogeneous network whose elements "define and shape one another";

(2) the material as a critical element – extending beyond the standard sociological social to include *things*; (3) a tendency for these processes (relations) to be precarious – they only 'just' hold together; (4) "power as an effect" that can circulate through material, in particular objects that act at a distance "by being defined and ascribed roles" (Mifsud, 2014); and (5) the importance of space and scale, that is "how it is that networks extend themselves and translate different actors" (Law, ibid., p.146).

Using this sensibility to re-think blended learning outside the binaries of human-technology, teacher-learner, classroom-online, hardware-software provides me with "a theory of interconnectedness through which to re-imagine educational practices" (Edwards & Clarke 2002, p.157). For example in the case of blended learning, the learning management system (LMS) might be considered as having a clearly defined role in the practice of bringing classroom and online educational practices together: 'blending'. Re-conceived, the LMS is an 'immutable mobile' (Latour, 1987) through which different networks of relations are made and unmade. This immutable mobile works to shape other networks through its relative stability and durability. It becomes an 'obligatory passage point' (Callon, 1986) in the network (of devices, places, times and people) that is negotiated with varying degrees of success: log in and take a test; post a discussion topic or respond to another; download a content file; use a link to view internet resources.

My commitment to taking a relational analytic position does not involve claiming that it is the only or the best way to do this work. I do, however subscribe to Law's (2009a) suggestion that taking this stance will enable me to overcome certain binaries that present themselves in other forms of learning and technology enquiry (human/non-human; macro/micro; social/technical). As Law suggests (2009a, p.147-148):

> We have seen that the social and the technical are embedded in each other. This means that it simply isn't possible to explore the social without at the same time studying the hows of relational materiality.

This suggests that with a material semiotic sensibility, exploring blended learning requires an acceptance that the stability of a given instance of learning cannot be ascribed to an explanatory agent, such as a particular lecturer, teacher or faculty (organisation). Practices of blending learning might be explained through other forms of stabilising architecture[20] such as:

20. Law (2009a) suggests that rather than providing an over-arching explanation, or the 'why' of sociology, ANT drops certain accepted foundations (e.g. nature – culture) and seeks to explain "configurations that might lead to relative stability" (p.148 ibid.), in contrast with sociological theory which "grounds its explanations in somewhat stable agents or frameworks". For ANT, there is no over-arching framework (macro/micro) or phenomenon (class; patriarchy). These become effects rather than explanatory foundations.

materials (hardware; computer labs; classrooms, the library); or discursive practices (student-generated texts; teacher-generated unit outlines; academic disciplinary practices). The webs of relations that are potentially revealed through this sensibility can offer no "general solutions" (Law, 2009a, p.155) to what it might mean to 'blend learning and technology'. In other words, there are no over-arching structures of blended learning to be identified, only what is made real through the practice of blending learning. These practices might materialise through specific, local practices such as between tutors, students, their text books, their in-class connection to the LMS and a multi-modal presentation. They might also emerge through actors at a distance, such as a supportive family member, a smart 'phone, a train ride and a chance meeting with a peer in the library. These are examples of blended learning taking form through specific practices.

This idea of reality being enacted (and told or explained through the ANT lens) represents a 'turn to performance'. Rather than an abstract reality, performances may be understood as:

> technologies, knowledges, and working [that are] the effects of materially, socially, and conceptually hybrid performances. In these performances different elements assemble together and act in certain ways to produce specific consequences (Law & Singleton, 2000, p.774)

Some of the elements of blended learning when seen this way that might have been conceived of as passive or static technologies (a learning management system, a library) can be discussed or described as a set of interrelated performances (Law & Singleton, 2000). Taking place in the everyday, performances are material practices that "are specific, (which) also leads to multiplicity, so that what appears to be one thing (an 'object,' 'working,' 'knowledge') may be understood as a set of related performances" (Law & Singleton, 2000, p.775), providing the idea that there might be multiple, coherent realities enacted (Mol, 2002).

From one to many worlds

An ANT perspective suggests that realities are only "*made* real in practice – they offer no framework for explanation" (Law, 2009a, p.147). To understand blended learning, it is necessary to follow the networks of heterogeneous actors – material and social – and the practices that bring these into being. Drawing an explanation from medical science, Mol's (2002) study of disease (lower-limb atherosclerosis) reveals a "body multiple". She argues that the varying sites of practice: patients' symptoms; a diagnosis; treatment; and the operating theatre generate four realities. An important leap is made here that separates ANT from other accounts: these realities are not proposed as different perspectives on *the* object,

rather, that: “different realities are being enacted here and there, now and then” (Farias, 2010, p.13).

For a study of blended learning, this might mean considering more than just a split of classroom and online or technology-mediated learning activity. Examining performances of blended learning may reveal hybrid, or perhaps contradictory ways in which it is practiced. Considering the human and non-human elements together may reveal unexpected or latent elements that might be missed in a social or human-centric analysis. For example, how might differing tutors, differing classroom layouts, mobile technologies, transport modes or other actors participate in blended learning across time or at sites other than classrooms or at a distance? How might the idea of a blended learning design (itself a performance) which is considered ‘transformative’ (Garrison & Kanuka, 2004) look when it acts on learning practices involving: a library, a slide presentation, a small group of compatriot peers and the closing hours of the library? How might the differing actors in the two scenarios above interfere or intersect with each other?

These types of questions are particularly relevant for a study of technology and its applications to learning. The conventional view of blended learning as a nexus of face-to-face and online interactions, or the use of a network as a guiding metaphor to explain how blended learning is practiced, falls short for a sociomaterial account. A socio-material study promotes making an account of blended learning as a series of translations that results in localised, hybrid performances. What happens when the students at VTC are unable to access the internet connectivity they need to use the LMS? How might blended learning be performed in the times and spaces between lectures and tutorials, and in the lives off campus that must be maintained by the students at VTC?

Contemporary Critiques of ANT

Early criticisms of ANT challenged the notion of ‘general symmetry’, suggesting that “humans deserve an ontologically distinct category for their ability to use language and other symbolic forms to generate and interpret meaning” (Whittle & Spicer, 2008, p.621). For me, it is not a question of ‘deserving’ a distinct category, since ANT sensibilities are not a claim that humans and non-humans are the same. Discarding categories (especially dualisms like nature/society) is a strength of ANT: its sensibility is to “pick up relationality as a logic which is not so much interested in categories or aggregates, but rather wants to analyze how actions emerge in and through relations” (Decuypere & Simons, 2016, p.10). In a blended learning study, the latent (network connectivity), the mundane (notes) and the obsolescent (a palm pilot) become visible as their role in *blending* learning is explored empirically and disentangled, creating

nuanced and different understandings of technology *and* human relations in educational settings.

General symmetry allows me to explore blended learning free from certain dualisms adopted in normative accounts. For example, there is a likelihood that an educational (or organisational) policy may emerge as an actor in my study as much as a network connection, an uncomfortable bed, or a train. What each of these actors 'does' is yet to be determined until disentangled empirically. A sociomaterial approach has "the generative potential of both presenting that [which] is unfamiliar in educational settings and of re-presenting the familiar in such a way that what is often not given [much] consideration is presented as well" (Decuypere & Simons, 2016, p.15).

Ivakhiv (2002, p.395) suggests that ANT lacks a "normative positioning". This, he argues, means that ANT is not suited to provide a critical analysis of large-scale, and structural power asymmetries such as "capitalism, patriarchy, racism, or colonialism" (ibid.).[21] This concern is challenged by academics of both sociomateriality (Edwards & Fenwick, 2014) and new materialisms (Fox & Alldred, 2015). Each point out many such studies that have placed themselves squarely in the realm of the political. Responding to the characterisation of sociomaterial studies as being apolitical, Edwards and Fenwick (2014, p.1386) find the critique "perplexing..., especially given the extensive number of broadly sociomaterial studies that address the political and political issues across a range of disciplines".

Starting from the laboratory as its early domain (following engineers and scientists), ANT has more recently found its way into "powerful networks"[22] (Fenwick & Edwards, 2010a, p.104). This gave rise to concerns about where to cut, or delimit the 'network'. With respect to 'cutting' a network, Miettinen (1999) argues that since a priori categories are said to be ignored in ANT ("no criteria for defining the nature and scope of the actors can be presented in advance" (p.181)), it might be asked: "how is it possible to decide what is important and what is essential and what is not without theoretical preconceptions?". This criticism elides the point that in 'objective' or normative inquiry, pre-determined categories do the 'work' of cutting (preconceiving) the network.

Further, an observation that ANT accounts pay too much attention to "big actors" (Miettinen, 1999) suggests that the marginal might be excluded through a process of "othering" (Law, 2004). Star (1990) gives voice to this concern: "By experience and by affinity, some of us

21. Indeed, as Alcadipani & Hassard (2010, p.430) point out: "exploitation, racism, patriarchy etc. do not in themselves explain anything – they are what precisely have to be explained".
22. These encompassed studies with commentary on religion, technical (aircraft) development, education policy, and politics.

begin not with Pasteur, but with the monster, the outcast".[23] Rather than limiting the value of an ANT account, Fenwick (2011, p.123) points out that

> ANT-readings need to move as carefully and reflexively as possible, mindful of their own tendency to create obligatory points of passage, cautious in neither totalising nor ignoring phenomena unfolding, and mindful of their own highly provisional accounts and the entanglement of these accounts in constituting the phenomena being read.

Close-up attention to the practice of blended learning like the approach offered through sociomaterial analysis provides a way of considering what might not be visible on first pass, but with further and deeper consideration actually has a decisive role in the practices of learning being studied. Acknowledging the strengths and weakness of my methodological choice has sharpened my awareness of its limitations and boundaries, but this choice has also given me freedom to experiment.

Section III - Methods

Since the purpose of the study is to examine blended learning practices 'close-up', a detailed tracing of associations among actors in the blended learning environment is needed. The material semiotic approach relies on the development of cases as its empirical foundation. In harnessing the material-semiotic approach, Law (2009a) draws from Kuhn's approach to explaining scientific puzzle-solving by suggesting that "knowledge lies in exemplars and words are never enough" (Law, 2009a, p.144). In the broader literature on educational computer use, Twining (2010, p.165) suggests that there is a need for greater 'detail in the data' supported by the use of observational techniques, which "fits with the use of case studies, [enabling] aspects of educational IT use to be explored in depth, using a range of quantitative and qualitative techniques".

Set within the context of higher education at a vocational education and training (VET) college, my study seeks to explore practices of blended learning in a blended learning setting that will add to our understanding of this educational approach. It is concerned most particularly with how blended learning is staged, performed or done every day. This question of "how" (Yin, 2014) concerns following "operational links needing to be traced over time" (ibid. p.9). A case study provides well for tracing associations between human and non-human actors in my study. Context is central to case research with the context in question affording attention to a variety of materials including: observations; documents; artefacts such

23. Though I would hardly consider a door-closer, speed bump or hotel key ring major actors, each of which came under the early gaze of ANT.

as the learning management system (including its discussion forum); the physical classroom environment; and interviews. In effect, the case becomes an arena or fulcrum that brings together the many relationships and functions in the study (Stake, 2006). As Gerrig (2007) suggests: "sometimes in-depth knowledge of an individual example is more helpful than fleeting knowledge about a larger number of examples". Experiencing the case as it occurs and in its local context supports the qualitative approach undertaken (Stake, 2006).

Although a case study is a common method of developing a study of this nature, it is not without its limitations. As Flyvbjerg (2011, p.302) has pointed out, there is a possible tendency towards "verification, that is, a tendency to confirm the researcher's preconceived notions" in case study work. As a teacher employing blended learning designs in my own practice, this may mean for me that I am biased towards finding data stories that show how blended learning works effectively, rather than identifying and exploring breakdowns. This concern is not exclusive to case study methods (Flyvbjerg, 2011). Reflexivity, self-awareness and being mindful of 'othering'[24] are strategies I used throughout the data collection and analysis phases of the research to help me avoid this bias.

Selection and Distinguishing of a Case(s)

The general context for the case is a single subject in an undergraduate course of study with a single student cohort. This fits with the general definition of a case as "an in-depth description and analysis of a bounded system" (Merriam & Tisdell, 2016, p.37). The unit of analysis or case is the practice of blended learning within a blended learning environment. This practice can be conceived to take in, or be embedded in, a number of contexts (Yin, 2014). These contexts include: (1) the on-campus environment, in particular the four tutorial groups making up the cohort; (2) the personalised learning environment of the individual students; (3) the learning management system (a common platform for all course participants) and other learning network or 'governance architecture', for example the unit outline.

The case and the provisional embedded units of analysis are shown below in Figure 8. These allowed for the possibility of units of analysis at more than one level (Yin, 2014). Yet acknowledging the fluidity of the practice under consideration, my design needed to account for the fact that these embedded units of analysis could intersect and overlay one another. Rather than strict lines of enquiry, this reflects the idea that in a case, "the boundaries between

24. I am influenced by Law's (2004, p.169-170) understanding of 'othering'. As Law has it, there are three types of 'othering': (1) what is hidden because something else includes or hides it – for example the automated messaging system in the discussion forum of the LMS; (2) insignificant or uninteresting – for example the effects of different brands of smart 'phones used by students in their learning; and (3) repression – for example in this case holding up the 'idealised' learner as an exemplar of engagement or scholarship.

phenomenon and context may not be clearly evident" (ibid, p.16). So, while the practice of blended learning within a blended learning environment formed the case, I needed to allow for these overlaps, confluences and intersections. For example, the tutorial room, around campus, getting to and from college and 'home' could all form parts of the practice of blended learning in a blended learning environment. The LMS, while available on campus, was designed as part of the course to provide a central repository of course materials – and importantly – as the site of the interactions that were required for students to complete their out-of-class learning. The LMS was available on smart 'phones, tablets and home PC's. It was the conduit for student-created texts and other learning experiences that could be accessed to explore a variety of relations developing over the semester. The discussion forum was a rich source of data and was selected as a site for further examination as part of the embedded LMS-related analysis.

Sampling and selection of participants

I chose a purposive sample within a context that provided the opportunity to study the practice of blended learning. The cohort I chose to study within that setting is a first-year undergraduate Business Communication class which has the largest number of enrolments each semester at Vocational Training College. Business Communication is taken across multiple degree programmes and offered me the possibility of a wide and varied sample of participants. The course has been designed to function through the Institute's learning management system (LMS) Moodle. This strategy provided me with the opportunity to engage with participants who were more likely to have experienced blended learning during their studies first hand.

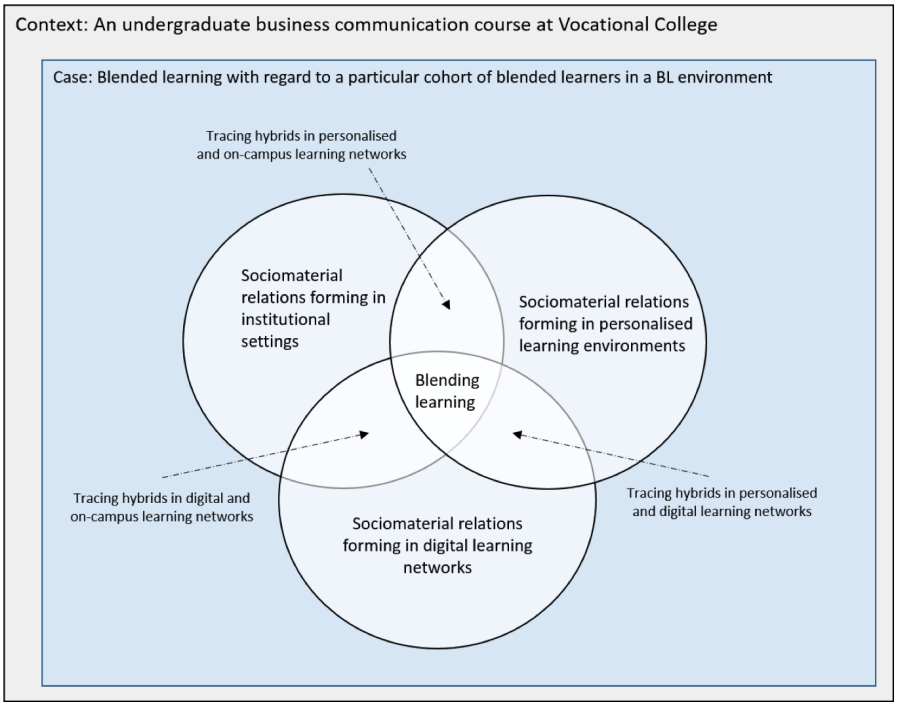


Figure 8: Tracing the blended learning networks (adapted from Yin, 2014)

I chose a random sample of twenty-five students from a pool of all students on the course who had indicated a willingness to join the study (50 altogether). The sample included many international students. Many were studying in English as their second language, and most had only been in Australia a relatively short time. Table 2 below shows the composition of the sample.

Pseudonym	**Gender**	**Age**	**Ethnicity**	**Degree**
Andrew	Male	24	Sub-continent	Accounting
Aaron	Male	18	Sub-continent	Accounting
Andrea	Female	26	SE Asia	Accounting
Barry	Male	27	English	Marketing
Bill	Male	27	English	Administration
Cathy	Female	23	SE Asia	Administration
Celine	Female	20	English	Administration
Denny	Male	22	Europe	Accounting
Deanne	Female	21	Sub-continent	Marketing
Jane	Female	33	English	Marketing
Jill	Female	21	East Asia	Accounting
Kevin	Male	21	Sub-continent	Accounting
Larry	Male	24	Sub-continent	Accounting
Mary	Female	22	Sub-continent	Accounting
Melissa	Female	22	English	Accounting
Merryn	Female	21	Sub-continent	Accounting
Neil	Male	22	Middle East/English	Administration
Peter	Male	30	SE Asia	Accounting
Ricky	Male	30	English	Marketing
Sam	Male	26	East Asia	Accounting
Tanya	Female	25	SE Asia	Administration
Teresa	Female	24	Africa	Accounting
Victoria	Female	23	South America	Administration
Vincent	Male	24	South America	Accounting
Yvette	Female	21	SE Asia	Accounting

Table 2: Study Participant Information

Data gathering

My principal data and data gathering techniques included:

1. individual, face-to-face semi-structured interviews with students (see Appendix);
2. observational data in the form of social network diagrams, used to assist students in explaining their learning interactions during the course, along with a schematic diagram of their tutorial room to prompt discussion about the activity there;
3. observational data of artifacts and material practice, used to enact the practice of blended learning; and
4. Photographs of various sites mentioned by participants in the study were taken. The images were taken by the study author, in many cases from the perspective of certain participants, for example from designated work spaces in the tutorial rooms or in common areas;
5. documentary evidence: students' text-based interaction on the Moodle discussion forum, and their LMS activity logs.

These techniques provided a repertoire of analytic tools that enabled me to investigate blended learning practices thoroughly and from multiple vantage points. The LMS log data, online conversations and class interaction sketches provided the detailed information I needed to examine digital, classroom and on and off campus practices – and the interaction between these – close-up. The provision of this data to individual participants during interviews helped them re-trace their interactions and activities during the interview. The photographic imagery enabled me to 're-visit' sites that had been referred to previously at a later date. The depth and variety of the assembled data provided a rich resource from which I continued to draw.

Data Analysis: Tracing the sociomaterial

INTERVIEWS

I undertook semi-structured interviews with each of the 25 study participants. Once interviews were transcribed, I reviewed each of them on a 'first pass' basis. Transcripts were manually annotated using 'descriptive coding' (Saldana, 2016). Three descriptive categories of effects were used initially: (1) social; (2) text-based; and (3) material (physical). This enabled me to highlight practices for further analysis in a second cycle. A second-cycle analysis assisted me to trace the networks of practices described by participants: the digital; the institutionally-based and those in personalised learning environments.

The idea of using a smaller sample was to enable me to concentrate my analysis in greater depth on fewer participants (twenty-five of the fifty who volunteered to participate). The

availability of data in multiple forms enabled me to move back-and-forth between the individual's personal accounts, those of their peers, those available through LMS logs, and the online discussion between participants. Further insights were gained by viewing the physical spaces encountered by the learners in and out of class. Multiple acts of dialogue, comparison and interpretation thus enabled me to "see specificity and context in some fine grain" (Yates, 2003).

My initial plan was to identify provisional 'sites of translation' (actor networks). Unlike the development of a realist-style network topology, this meant searching for any form of sociomaterial translation where one form of actor influenced another in the 'doing' of blended learning. Markers included: (1) texts generated by students both in their learning tasks and interacting online; (2) social interactions described by the participants in a range of settings from tutorials to Facebook; (3) material encounters with hardware, college infrastructure and software applications. Some of the more obvious sites for following blended learning practices I considered are shown below in Table 3.

Action	ICT Hard/soft	Infrastructure	Noise	Human	Text	Time
copying	desktop computer	bus	music	friend	assignment	day
eating	mobile phone	cafeteria	animal	peer	book	night
hearing	tablet	car	people	relative	discussion post	
pasting	notebook/laptop	dining table	ring tone/message	study group	email	
seeing	IT network	hallway		teacher	policy	
thinking	television	home		mentor	text message	
typing	radio	library			unit outline	
walking	discussion forum	own room				
test	Facebook	shared room				
driving	Wi-Fi	train				
drinking	learning object	tram				
talking	LMS (Moodle)	tutorial room				

Table 3: Some possible sites of translation for blending learning

It should be noted that these sites are *not a taxonomy* of what might be inter-connected to 'form' a blended learning scenario, rather they were a sensitising device to consider which practices might emerge. It should also be noted that some of these items are hybrids in and of themselves, for example the mobile telephone and its LMS app with the individual user-student constitutes a blend of elements. Where and when the student used the app and its effects became of analytical interest as I followed their activity further 'downstream'.

A second 'pass' of the interview transcripts and a reading of the photographic, graphic and LMS log data enabled me to identify what particular actors - either human or material - were compelling other entities to act. Some postings on the discussion forum displayed the properties of an 'immutable mobile'. Others were changed and adapted by other actors (for example those appearing from outside the student cohort), making particular postings into

'fluid objects'. Some activities prescribed for the course participants to demonstrate their learning (for example online quizzes and discussions) generated considerable activity. The product of the discussion forums provided a rich source of data for tracing the relationships between the technologies, the social interactions of the students and their learning practices.

In some cases, mundane technologies sustained activity and social interaction. Where these activities and interactions failed became a useful site for closer examination of the practice. This was an especially helpful analytic strategy and one that enabled a contrast with methodological approaches where such failures might be bracketed out of the analysis.

I also looked for tensions that arose out of the participants' responses in the transcripts. These included social inclusion or exclusion, along with any technology or other artefact that might have made these relations possible or difficult. Like Thompson's (2010) analytic approach, I looked for the emergence of 'unsettling spaces' between learner and teacher, student and peer, participant and external social or material actor.

Drawing on Michael (2004), Thompson (2010, p.90) describes a co(a)gent as "humans and non-humans operating together to produce patterns of connection". Co-agents provided me with an "analytical fabrication that adds value when it illuminates otherwise hidden processes" (ibid., p.90). I looked for hybrids that could indicate that blended learning practices might be distributed, pluralised or contingent, or form some other arrangement of these phenomena. For example, several of the participants indicated a strong preference for a particular type of hardware when undertaking their learning tasks at home or on-campus. Others were only able to undertake their off-campus learning at particular times of the day or night. Blended learning for these participants included different configurations of spaces, noises, times and technologies (both hardware and software). Yet at the same time, these networks coalesced at particular moments and in particular places: a quiz; an assignment; a Facebook Group discussion; a lecture.

The use of Heuristics

A strength of the case approach is the variety of data that can be brought to bear, increasing the trustworthiness of the study. I relied on several other heuristics. A heuristic is a strategy that can be 'actioned' to assist in making meaning from an array of complex and potentially conflicting information. It might be used to present information that is considered "incomplete but highly useful" (Gigerenzer & Gaissmaier, 2011, p.454, citing Holton, 1988). Heuristics are often associated with decision-making under uncertainty (Mousavi & Gigerenzer, 2014) and are helpful analytical tools. The decision to employ a heuristic suggests

that a fully detailed and rational model does not exist to frame the debate or discussion at hand. Markham & Baym (2009) argue that technologies have inherently multiple identities and that judgment about the boundaries of such technologies must be suspended to allow the study to engage with the *situations* in which the technologies are found.

Diagrams and Images

A device sometimes used to represent learning encounters in education is the diagram (Stevens, 2016). Visual representation served to clarify my thinking about how different students experienced the LMS, the classroom and other networks. I initially employed social network analysis diagrams to enable me to trace a 'network ethnography' (Howard, 2002). This enabled me to extend the sociograms derived from the student online interactions with their daily experience, including: locations on and adjacent to campus; their travel to and from college; their home and study location; and their technology use as they went about their learning tasks.

The social network diagrams served as a kind of boundary object for "sharing data, for pointing to things – without actually demarcating any real territory" (Star, 2010, p.608). During interviews, these diagrams assisted in uncovering and exploring interactions between students that involved stabilisations and disruptions such as: inclusion and exclusion; balancing information 'overload'; and control of the learning experience (Fenwick et al., 2011).

I also used schematic diagrams of each student's tutorial group room to elicit feedback during the interview about what was happening in their classroom and within their immediate vicinity. These diagrams acted as a prompt for participants to recall certain relationships, interactions and activities that went on during tutorials. They also provided me with a more-than-singular perspective of activity in each of the tutorials, since participants came from all four tutorials. Many of the participants I interviewed were also close to other study participants in the class, providing me with insights into particular social or learning groups.

My other encounter with images was with the photographs I took of the various physical spaces occupied by the students and their technology at various times during their studies. These included three mobile locations: a bus; a tram; and a train. I used these photos to 'think with' (Jackson & Mazzei, 2013), rather than document any particular activity with regard to the students' spatial practice. This is consistent with the notion of sociomaterial analysis as part of the research itself, part of the de-centring of the human as the research subject in education: challenging the idea that "individual human beings or discourse are the only proper ontological units or locations from which to produce (educational) knowledge" (Hultman & Lenz Taguchi, 2010, p.538).

LMS Log Data

I used certain quantitative data to assist me with particular analytical decisions, rather than for the opportunity to conduct quantitative analysis. Some of the LMS log data provided me with a snapshot of: (1) especially busy times on the LMS – an insight into the times students were engaging with the online technology, down to the level of the individual student; (2) the volume of discussion arising between students, for example who the prevalent and absent members were in the discussions, how many posts were made and how many replies were generated; (3) which learning objects were accessed, when and how often.

Like the photographs, social network diagrams and tutorial sketches described above, my aim with the LMS data was to use it as a sensitising device rather than an end in itself for analytical purposes. The heuristics I was able to employ from the LMS data included:

> (1) the text and log data of extended discussions. These show traces of how sociomaterial relations are formed, sustained or broken. By developing a detailed picture of the practices around these learning encounters, I was able to better understand the: participants' technology use (hardware platform, software used, data manipulation or technique); their physical environment (location, infrastructure, presence of others); time(s) of activity(s) and reasons for exchanges on the LMS; and
>
> (2) the level of engagement[25] with the LMS and the discussion forum for each of my interview participants. Like the network and tutorial diagrams, the discussion participation enabled me to draw further information from each participant by allowing them to review their text. In reviewing their discussion text, participants articulated a variety of blended learning practices: what was happening during the exchange; how they might have benefitted from the encounter; where they were; the influence of 'hidden' others in their learning network; where, when and how often they 'logged in' and for what purpose.

Each of the two LMS heuristics described above complemented my efforts to develop a thick description of the practices demanded of an ANT study. In many cases, they complemented the development of detailed tracing of hybrids as they brought out other less visible elements of each learner's network: a parent; a boss; a trusted friend or a sibling. The variety of social and family connections for each participant was complemented by the varying use of their technology: tablets; smart 'phones; laptop and desktop computers and the attendant variation in software applications employed on each.

25. Engagement in the context of this study is considered from the perspective of: (1) how many others they corresponded with; (2) how many words they authored; (3) the 'depth' of exchanges they engaged in (based on Knowlton's (2005) taxonomy).

Limitations

Highlighting the interdependency between researcher and researched (Mulcahy, 2016) is an important 'move' involving an acceptance that my work will emerge as an encounter with the data rather than as a detached reading thereof. The practice of research is itself performative: "particular realities are brought into being" (Law, 2004, p.31) through the different ways in which different forms of data are gathered and analysed. My own inscription devices (Latour & Woolgar, 1979) included: the LMS data logs, UCINET[26] (Borgatti, 2002), Microsoft Excel, Microsoft PowerPoint, Adobe Acrobat Pro DC, and an iPhone, functioning as a recorder and camera,[27] each of which potentially played a role in producing my report of reality. As a researcher, I am "entangled in the research phenomena in concert with the wider sociomaterial assemblage of persons, texts, software, hardware, etc" (Bhatt & de Roock, 2013, p.12).

There are other method-level concerns that may be a challenge to the trustworthiness of my study. For example, the study took place in a higher education setting within an institute where the primary function is vocational education and training rather than at a university. Coupled with the fact that this is a single-site study, it may be concluded that there are limitations to the transferability of the study results to other sites and other institutions of higher education. Likewise, the limited sample size may suggest that generalising findings should proceed with caution. Further, pre-conceived notions may have influenced my position as a researcher pointing to the possibility of 'verification' (Flyvbjerg, 2011) as a source of bias. In addition to this source of bias, there are significant material differences between myself and the participants in the case that may have fed pre-conceptions, perhaps leading to value judgments on my part about how they should 'do' business studies.[28] I undertook my own business studies undergraduate course some years ago as a mature-aged student. Yet even at that point I had been in paid employment for over 15 years, eight of those years in a managerial role in the public sector. I was therefore mindful of the need to carefully consider how I interpreted my interview data given the contrasting age, gender and experience levels of the interview participants and myself.

In the opening Chapter, I declared my position as a 'teacher-technologist'. I have been a willing adopter of new ways of presenting business studies learning content[29] since changing careers over ten years ago. Over that period, I 'bought-in' to the 'booster' (Bigum, 1998)

26. Sociograms produced to support interviews in this study were created using NetDraw.
27. And the many algorithms behind the functionality of each form of software mentioned such as 'search', 'parse', or 'export' and so on.
28. I add to this my status, since 1986, as a 'digital immigrant' (Prensky, 2001). I still have a copy of my first assignment handed in at night-school proudly asserting the features of the Apple Mac Plus, with my instructor's comments noting that: '1 MB seems like a lot of RAM for a PC'.
29. This has included adopting: (1) multi-modal (in-class) presentation techniques, (2) on-line approaches through various LMS (for example: online discussions, learning objects with 'live' links, and podcasting), and (3) other technologies such as a text message student response system (linking lecture participation to live updates to Q&A sessions presented in slideware).

discourse on technology and how it 'enhances' learning. This is another form of pre-conception that might influence my gathering and interpretation of the data – a danger that I might seek only positive or successful stories about how blended learning is enacted. To mitigate this concern, I purposely sought and elucidated problematic, unresolved and potentially difficult issues that came to light in my encounter with the data. I have tried in effect to avoid presenting my work here as an "unproblematic truth" (Gad & Jensen, 2010, p.77) and instead to engage with mess and multiplicity (McCoy, 2012), avoiding the temptation to resolve tensions, or solve 'problems'.

Ethical Considerations

Being attentive to ethics is an important researcher practice. I sought and obtained permission from the Dean of the Faculty to conduct the research. During the course of the research, I stood down as the Unit Chair of the subject. The study proposal underwent a formal ethics application, review and approval process within the University of Melbourne. Participants were informed of the purpose of the research and how it would be reported, and they were provided with a detailed statement of how I would go about gathering the data. Participants were also able to withdraw from the research at any point. Data security was ensured by using the physical and digital security available in the VTC facilities and on the network on Campus. I employed pseudonyms to maintain the confidentiality of all participants, and for any names that were mentioned incidentally during the interview process. I also disguised particular countries mentioned in the data by using a regional designator and to assist with maintaining the confidentiality of the information provided by participants.[30]

CONCLUDING REMARKS

While I acknowledge that there are many appropriate methods that might have been brought to bear for this study, I gathered as many types of data as I could access, to open the possibility for encounters with complexity, multiplicity, discontinuities and difficulties in an unfolding assemblage. I have chosen ANT, not as a monolithic theory, but rather as a sensitising tool kit that might help me traverse[31] through an area of educational research that seems "awash with bold assertions and confident claims" (Selwyn, 2016b, p.437). To address the question of what counts as blended learning, I now aim to open some of the 'black boxes' that lurk in the educational technologist's lexicon such as: 'teaching model', 'ubiquity', 'affordance', 'learning management system', and 'intervention'.

30. Permission was also sought and gained to use the diagrams shown in Chapters 1 and 2 (Figures 1-7).
31. Or perhaps "trudge" as Latour (2005, p.25) would have it.

Chapter 4

Blending learning and friends: Social practice and more

> *"What if our starting place comprises always already interrelated, reiterated sociomaterial practices?"* (Lucy Suchman, 2007)

In the following chapters, I explore the hybridity and contradictions of "particular, smaller-scale, heterogeneous actor networks" (Law, 2009a, p.145). I start by tracing sociomaterial relations with a human focus. I provide a background for the learning context in the opening section, then an exploration of how blended learning is enacted through two small-scale networks of 'blended learners'. Acknowledging their entanglement and for heuristic purposes only, I lift social and material-social practices up to view. I have departed from the conception of 'learners' as discrete 'entities' and look at them as 'actors' with shifting compositions over time (Nespor, 1994). In the Chapter that follows this one, I extend my analysis with increased emphasis on sociomaterial practices. The third data chapter is focussed on artifactual work and material practices.[32]

Section I: Design for Blending - Background

Business Communication is a foundation subject in all business degrees at VTC. The course seeks to: "consolidate and extend students' communication skills in areas that are especially relevant to undergraduate degree level studies..... It also seeks to develop the linguistic, academic and research skills essential for success in the Australian higher education sector" (VTC Business Communications Subject Guide, 2012).

The learning objectives of the course are:

- Research for academic and business writing.
- Listening and reading skills in academic and business situations.
- Planning and presenting different styles of written business documents – short and long formats.
- Comparison and contrast of varied academic and professional sources of information.
- Development and articulation of a coherent written argument.

32. The orientation in the third data chapter is material, contrasting with the human focus of this one.

- The use of academic conventions including referencing, acknowledging and document formatting.
- Persuasive oral presentation.
- Strategies for examination preparation.

The subject requires four hours weekly contact on-campus over 13 weeks. There is a two-hour lecture (large group) and two-hour tutorial (small group). For each hour spent in class, students are expected to spend two hours researching, reading, and reflecting on course material (VTC Guide, 2012). Assessment items comprise: (1) a literature review (10%); (2) an essay (2,000 words; 20%); (3) a 10-minute oral presentation; (10%); (4) contributions to a discussion forum (10%); and (5) progressive quizzes (two) and a final examination of 2 hour's duration (total: 50%).

The Learning Management System (LMS) for the subject (Moodle) forms a centralised on-line resource for students. Figure 9 (below) shows the screen that greets the students and the teachers when they log in. The 'system' hosts learning materials such as lecture slides, readings and links to external resources.

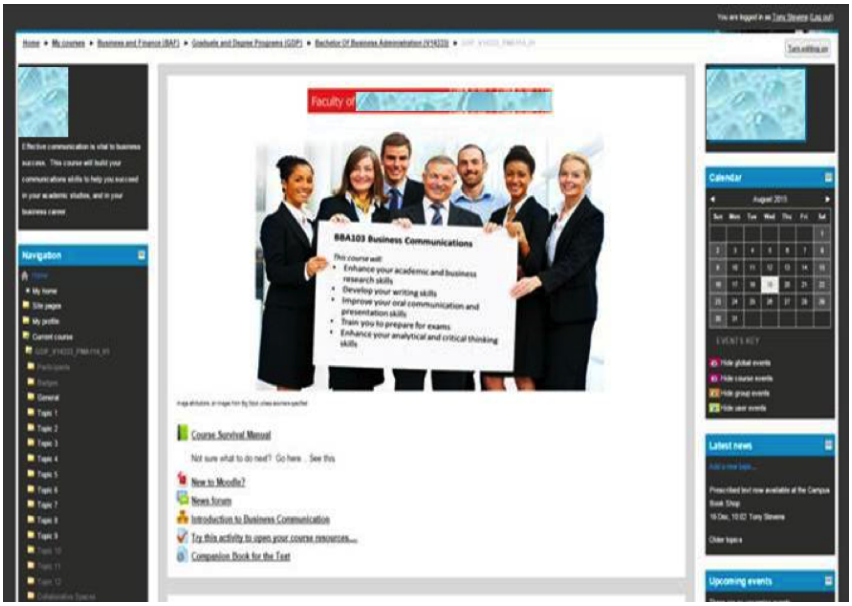


Figure 9: The Moodle interface

Temporal Activity Flows on the LMS

Since the students accessed and used the LMS during their learning tasks, the level of activity in the learning management system is of interest. Figure 10 (below) shows the temporal flow of activities based on student logins over the 13 weeks of the course, leading up to the

examination period. Peaks in activity can be accounted for through various events. For example, there is a peak around 20 August (Week 5) which is when literature reviews were due for submission and the first progressive quiz was conducted. Notes shown on Figure 10 label the events or more that were occurring on the course coinciding with a cumulative number of 1,000 'events' in a given week on the LMS. Other events of significance occur through the full continuum of the LMS activity – these appear in the discussion below.

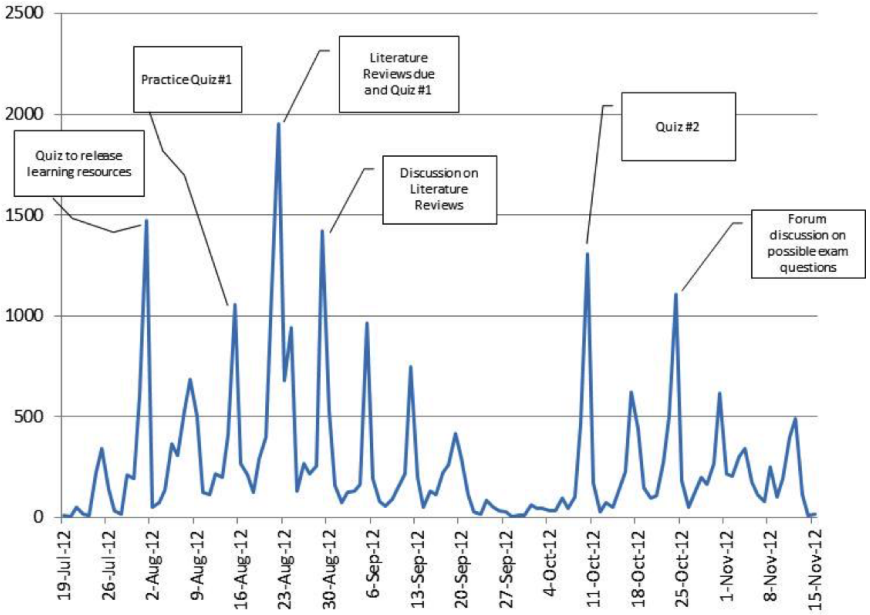


Figure 10: A chart showing the LMS activity by day over the period of study

Section II: Blending Learning – A Co-production

In the on-campus environment, blended learning at VTC is delivered via lectures and tutorials and supported by the LMS (described above). A 105-seat lecture facility is used for Business Communication lectures, in addition to lectures for other subjects such as Economics and Accounting. Blended learning technologies employed include: digital projectors; a document camera; presentation slideware; the local area network (LAN) and the internet. Combining the lecture, tutorial and LMS learning tasks, this approach is consistent with Alammary, Sheard, and Carbone's (2014) prescription for blended learning: that it contain both face-to-face and online components.

Small groups form in the lecture and tutorials that lead to a variety of informal learning opportunities, both on and off campus. These are illustrated through a description and analysis of two 'typical' networks that follow, each offering an example of the varied but characteristic elements that assemble in blended learning practices. Further, the way in which

these networks negotiate meaning and form identity is suggestive of a community of practice (Lave & Wenger, 1991) as is explored further below. The final section is devoted to exploring the breakdowns that occur in these networks, revealing them as provisional and fragile.

The first sub-group of five (Go5) participants (Melissa, Jane, Deanne, Ricky and Neil) forms through the bonds they develop in the lecture, the tutorial and online in the discussion forum. They attend Roger's Wednesday 2:00pm tutorial. Melissa describes meeting Jane and Neil:

> That's how we met, we sat in the same place every time, so we just sort of went from there. We used to just message each other and that sort of thing. With Neil, he just came up to me in class one day and asked if he could be in my group and that just unravelled from there... and then we would talk about this class and work with each other there.

Relationships formed in the tutorial are described here by Deanne, for example between her, Melissa and Ricky:

> This is my first semester here, so I didn't have any friends ... Um, Melissa though, she was in three of my classes so we did some of the presentations together, we did some study together, so ... yeah.... Ricky pretty much sort of ... I started getting full marks for stuff to begin with ... (laughs). And he goes: "I'm coming and sitting next to you then". So after that I pretty much couldn't get rid of Ricky (laughs) he was sitting next to me. We became really good friends after that. He would call me up and call me "boring" because I was studying too much.

While the focus in this Chapter is on human/social practice, it is noteworthy that movement ('I'm coming and sitting next to you then') is a material practice involving seating arrangements. The tutorial room is shown below in Figure 11. The image is taken from the back row of the room, a place where Melissa describes the group's learning activities:

> So we all just used to sit together, and talk about everything together, especially in the back row, and anything that ... if he [Roger] used to give us images on the computer or anything, we'd sort of split together, go up on the computer and do it. And that was the main way that it would work.



Figure 11: Deanne, Ricky, Melissa, Neil and Jane's tutorial room

By 'go(ing) up on the computer and do(ing) it', Melissa means accessing the digital version of the text book visual resources in Moodle, such as a model of the communication process.[33] An exercise in class might involve asking students about how the model might work, or for a practical example. Ricky uses the space in the tutorial room to move around and interact and learn with peers (see his sketch in Figure 12 below):

Ricky I had everyone from all ends interacting with me. So sometimes I would get up and move to the other side of the class.

Tony So you were active, moving around?

Ricky Yeah, being someone who wasn't sure of some of the content that we'd have, I'd definitely want to hear what [other] people would have. There were people that were definitely a major help to me, if I didn't know a question they'd give me the answer to it, or a rough idea, and maybe some people I would go and help.

The material practice of movement in the classroom, seating arrangements as a form of embodied meaning making, is once again apparent in the data.

33. More detail on these material practices and learning objects is provided in Chapter 6.

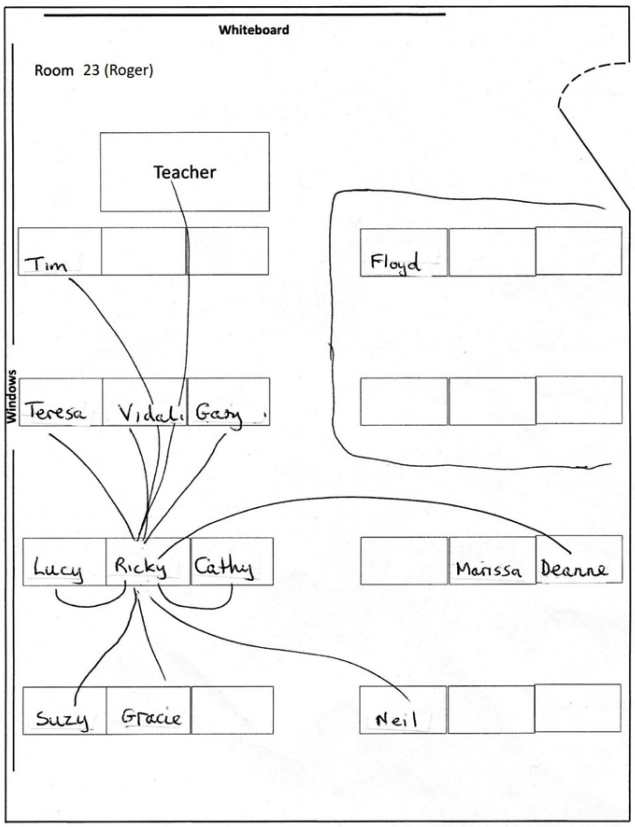


Figure 12: Ricky's tutorial room sketch

Social bonds appeared to form around how 'seriously' students took their studies as Deanne describes:

> Uh, so, Neil and Melissa, we would just, … they were pretty serious about the subject, so they would always discuss, like, when the assessments were due, what everyone's done, what's going on. And Neil would be walking up and down the class asking everyone's marks, you know he was very competitive, he was sort of, like, he would make us buy him stuff if he got more marks (laughs).

Learning relationships also developed around assessment tasks as Jane explains:

> Ricky and I actually handed in our assignments at the same time and he was very stressed about it so I got the impression that he wasn't going to do well. So when it came out that he did well I kind of wanted to read what he had written just to get an idea what a good quality assignment is.

It is important to note that these students – like the rest of their peers – are first year Higher Education (HE) learners and, as such, they are in transition from being either Diploma

students (Ricky, Melissa, Neil and Deanne), or in the case of Jane, a commencing mature-age student. Essentially, they build a Business Communication subject identity through negotiation of meaning in the group's practices (O'Donnell & Tobbell, 2007). Deanne identifies with Neil and Melissa who 'are pretty serious about the subject'. Jane relates to Melissa as 'just young and easy going, smart and studies hard'. She also finds one of Neil's discussion posts 'had a lot of meat' in terms of content. Ricky sought peers who might be 'a major help', such as Deanne.

Identity develops over the use of common tools or ways of doing things. Deanne describes how the use of mobile telephones facilitated group members offering assistance to each other within and beyond the immediate needs of the course:

> Look yeah, we'd text, Ricky would call, Melissa would always text, because we had some presentations and things together. I would ask her, she would tell me if there was any topics that she needs to know about.

In some cases, certain practices helped to define the group. Neil talks about the activity in the tutorial between himself and the others as 'helping each other to get higher marks'. In the context of posting to the forum, Deanne reports that 'sometimes we would tell each other to respond to each other's posts'. Constructing meaning together becomes a defining practice of the Go5 (Merriam, Courtenay, & Baumgartner, 2003). Rather than defining this blended learning network by 'where students meet and how they use technology' (McGee, 2014, p.33), blending learning is an emergent social practice which is sometimes mediated by technology. Here, Neil explains how his peers become closer through their shared experience on the Moodle discussion forum:

> I think that … the thing that broke the ice, how we became friends, is through Moodle when we started chatting, interacting on the forum; we'd say "hey, you had that idea on Moodle, and I think it meant … this and that". Then we might argue about it. That's how we got close to each other, through Moodle.

These practices do not operate as a 'closed' network. There is a constant ebb and flow of other networks that overlap, impinge and interfere with the 'goings-on' in the network (which in a situated learning theory frame can be construed as a community of practice). These are discussed further below.

The Moodle Forum

As a translator in the blended learning environment, the general volume of activity in the discussion

forum is of interest for this case – Table 4 below summarises the number of discussions and the number of items 'viewed' in each forum between class members for the duration of the subject. The Table provides a general indication of the activity level on the Forum. As a compulsory assessment item, the discussion forum learning tasks take on the nature of an 'obligatory passage point'. The forum consists of four individual learning tasks, containing "its own coherence and logic" (Callon, 1981, p.206). The lecturer, tutor and students' roles are defined clearly through the unit outline, which explains: the expectations for each student, including: (1) the writing style to be adopted (academic); (2) the tone students are to adopt (empathic/respectful); (3) frequency of posting (recommended once per week); and (4) collaborative practices such as constructive feedback.

Items	Discussion Purpose			
	Introduce yourself and respond to a reading (on information literacy)	Post a literature review and discuss	A case study	Design an exam question (2)
No. of discussions	105	79	55	47
Average item views/ student (3)	19.5	18.5	6.6	8.7

Notes: (1) Based on LMS report data; (2) This forum was used in conjunction with Google Docs so 'view' data is dispersed between two tools – only forum data shown; (3) Item 'view' data is diluted because forums allowed for subscription, allowing students to view posts via e-mail without logging into Moodle.

Table 4: A summary of student forum activity by discussion and thread counts

The 'Competent' Blended Learner

Later, Neil finds that his posting on the topic 'Information Overload' and the good result achieved in this learning task (10/10) draws attention to his work. The Facebook page that emerges from Neil's description is a way of mobilising the web of relations through a more informal channel.[34] The discussion post serves as a kind of inscription artefact that not only defines a Go5 practice, but also helps to enrol other learners into the network (referring to his discussion network in Figure 13 below):

Neil — It was like kind of a shock for me … That was the good part of it. There was only three people I don't know, the rest were friends with me. She [Lucy] posted on Facebook on a page she made, 'Business Communication Group'.

Tony — Was that like a bit of a study group on Facebook?

Neil — Well, she made it and then she invited us, we all joined. We liked the page, then we have posts every now and then.

34. The role of Facebook will be discussed further below in this Chapter.

Tony Any other interactions, during problem solving or exercises?

Neil I think Andrew, he commented on most of the posts I had on the forums; he was the one in class I didn't know, I looked for him two weeks until I found him… Jane is only here for school work, and Melissa as well. Jane…, I interacted with her on Facebook for some ideas as well, but it's strictly for class.

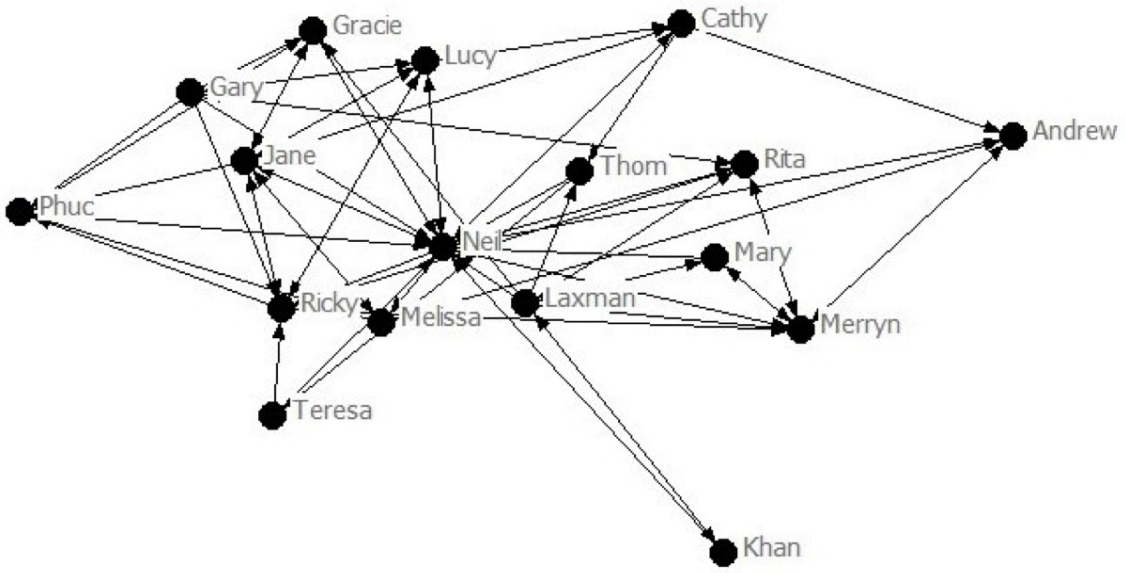


Figure 13: Neil's online discussion network

The responses Neil received from his 'friends' described above is consistent with findings in previous research on blended learning that identified friendship as a driver for student responses in online discussions (Stevens, 2013). This is also described by Melissa:

Tony What prompted you to respond to things?

Melissa Well, I usually responded to things because they were my friends and I would know what they're talking about, so I would mostly reply to theirs. Even Jane would be like "can I borrow your lit essay" for the actual essay, I'd be like "okay". So I would work with them on that. So that's about it; because I know them, yeah.

The CoP is used here as a linking-concept that is helpful for discussion about group formation (in this case Jane, Neil, Ricky, Deanne and Melissa). The study departs from human-focused groups in subsequent chapters. As a CoP, the group coalesces around common resources such as a literature review or essay: Jane wants to see Ricky's essay 'to get an idea what a

good quality assignment is'. Their engagement through their personal contact and their online activity through both the LMS and Facebook is a marker of community membership. They experience competence and "know how to engage with others" (Wenger, 1998 p.151).

A Detailed Encounter in the Moodle Forum

Taking a particular interchange that evolved over twelve days between Jane and Neil in the discussion forum helps illustrate blended learning practices. Jane is a correspondent in the social network that developed around Neil's forum exchanges. Their text (Figure 14 below) illustrates the type of learning practice that might be expected in a discussion forum that complies with the criteria laid down in the unit outline. During the interview, Jane reviews correspondence with Neil and comments:

> I found that Neil in particular was very sociable, and he would have gotten into a lot of threads. I think that … he was doing very well in class as well, and what he had to say had a lot of meat to it … I kind of found out that he got 10/10 for that … Well I mean we found it um …very interesting, because I followed the criteria in how to do some of the discussions. I tried to challenge him as well, give some questions to try and make it more fun and interesting for him as well.

Neil indicated that he had posted the initial literature review (learning task) 'in another class in two hours'. Jane responded 12 days later at 1:06am, accessing Moodle from her Laptop computer off-campus. Neil responds to her 'challenging questions' on the same day that she poses them, soon after midday.

Authoring her post containing the questions to Neil at 1:06am is not unusual for Jane: of the 140 login events recorded on the LMS for Jane relating to reading, posting and editing on the forum, just under 40% take place outside of class hours between 6:00pm and 8:00am.[35] She finds a need to balance her time between her parenting and her learning: 'and with my son, I kind of reserved most of my study for when he wasn't around or when he was in bed, so I'd have to stay up late'.

35. In contrast with her correspondent Neil who, for his 72 LMS forum login 'events', there were 28% between 6:00pm and 8:00am.

Literature Review
by Neil - Monday, 27 August 2012, 11:33 AM
Information Overload
Steve Steinke (2002) discusses the problem of people not recognizing the difference between information overload and not having time to go through all the information because of other aspects, such as time, priorities, and how well organized people are. His argument can be valid considering that people don't pay attention to the fact that time is a huge factor, and can be easily confused with information overload, or too much information to handle..... [Continues]
Reference list:
Steinke, S (2002), Yikes! Information overload: LAN Strategies & Solutions for the Network Professional, Network Solutions Magazine, vol. 17, no. 11. (Nov 2002): 8.
Hogan, E (2001), The Attention Economy: Understanding the New Currency of Business, The Academy of Management Executive, vol15, no.4 (Nov): 145-147.
==========

> Re: Literature Review
> by Jane - Friday, 7 September 2012, 1:06 AM
> Hello Neil,
> Well done in choosing two ideal articles!! In response to the opinions and theories posed: I found 100% relevance to the topic and they were both directly and accurately addressed. You have presented the reviews in an interesting and easy to read manner, with a great deal of logic.
> I believe what is written above, as I myself had a hard time finding articles due to this abundance of information. In doing the review; it is true, time limitations do affect quality and the ability to harness the correct information, efficiently and appropriately. I am living proof of the reality of the issues involved.
> I guess, I'd like to pose some questions to you for thought and get your mind really thinking:
> Q1: What methods could be utilised to improve these situations and gain the most out of it? i.e. as individuals and as systems within corporations etc?
> Q2: How do we go about implementing better usage of data and efficiency? Along with monitoring issues? Is it necessary in this dog eat dog world?
> Q3: Are there be any ethical issues with the media or release of information or even standards to be set? Or should this be entirely up to individuals and/or companies etc?
> All the best Neil in the rest of your assessments.

==========
Re: Literature Review
by Neil - Friday, 7 September 2012, 12:43 PM
Hello Jane, thank you for taking the time to read and respond to my Literature Review. In response to your questions,
A1-A2: As people we sometimes fail to prioritise between the important things that actually matter and we run straight to the personal needs first, for example: If we are waiting on an email regarding work we're doing, and we go on our email to check. But suddenly we see an email from a social network like Facebook or twitter that someone just replied to a status or commented on a picture you posted, you will immediately and unconsciously forget about the actual email you were looking for and instead focus on what isn't a useful priority in your life. But that's just what I think
A3: I believe the responsibility falls on us as individuals because the social media will be there constantly trying to grab your attention, just like TV shows or advertisements, and let's be honest here. We have a weakness towards that issue nowadays, because we find it hard to look the other way with all these offers and networking that we do through the internet. This also proves that there is a really low percentage of people who actually use the social media as a useful recourse for a few things. For example: advertising your own business, publishing your art, or even starting a page that supports a cause.
I hope my answers were useful for you.
Kind regards
Neil.

Figure 14: Forum exchange between Neil and Jane

Jane is the most prolific writer in the whole student group in terms of discussion post length (4,764 words cumulatively) and in the top five of sending and receiving messages (18 sent, 13 received). This belies the expectation for an assessment item weighted at 10% of the final value of the course result. Jane has 14 different correspondents across all four tutorial groups.[36]

36. The number of discussion forum 'correspondents' (also known as 'alters' in social networking terms) for each of the other group members was: Deanne – 17; Neil – 15; Melissa – 10; Ricky – 14.

Through her wide reach in the forum, Jane enrols others into the digital practices of a 'blending learner': 'I posed quite a few questions to his review, and a few other people responded as well, because I tried to encourage people'. Melissa too enrols others in the discussion: 'Well, I felt bad for them, some of them had no responses so … so I would sort of respond to them, give them a bit of feedback'.

Going Beyond the Forum…

Jane's learning network extends beyond the immediate group of five to a small number of confidantes. She describes their involvement in her studies (refer Figure 15) thus:

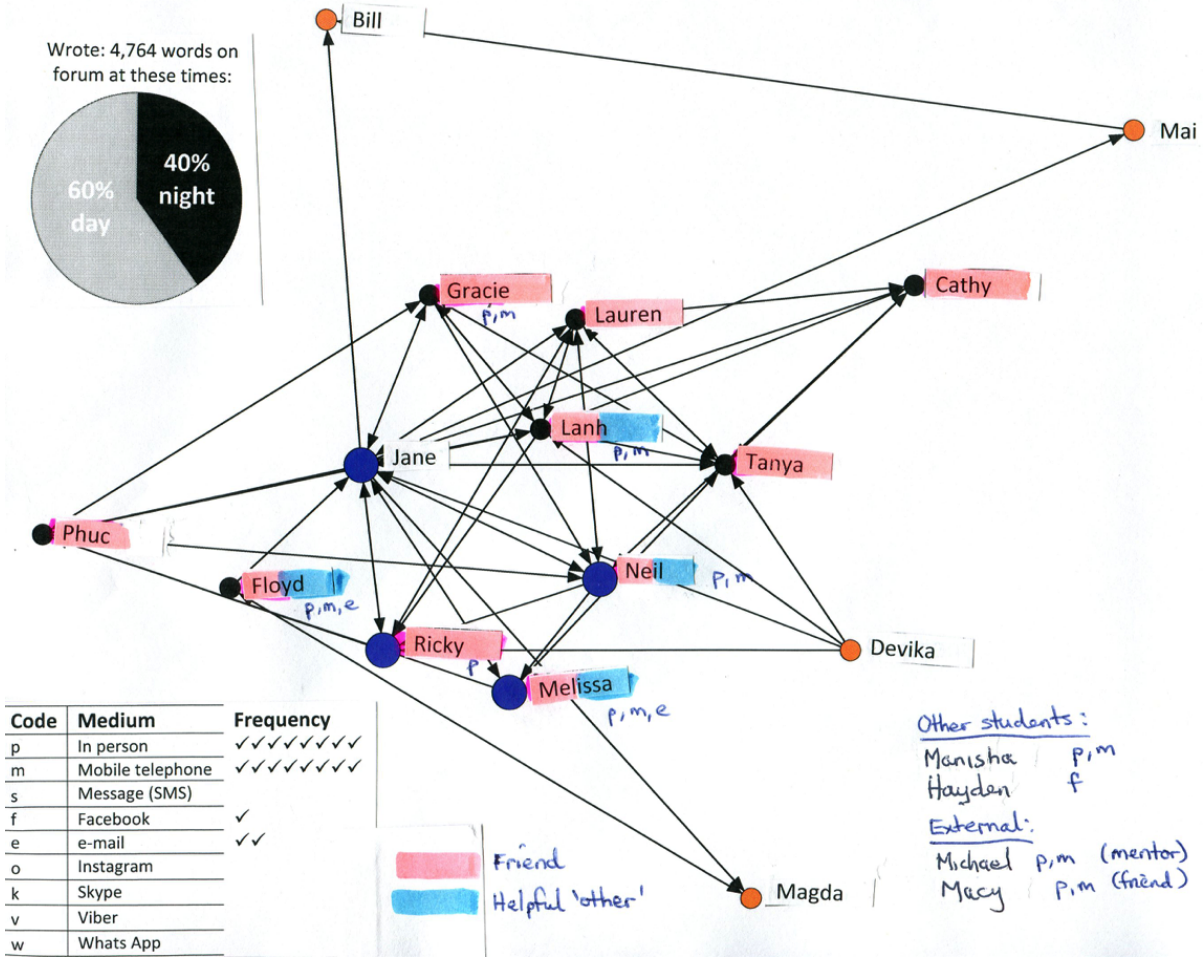
> Oh, okay, well Michael owns a business, a team, a small team … But um, through this course and the years I've been trying to look for mentors, and with his business he's got 35 years … he would be very interested in how the course is going. With the latest topic, we might talk about it. Michelle, she's just a friend, a very close friend of mine because we both have kids; we'd just sort of talk about the course, what sort of career choices … I did end up sending Marco a copy of my essay because it was the top grade.

Most members of the group report additional others external to the immediate network on whom they relied on or confided in. O'Donnell and Tobbell (2007, p.315) suggest the individual learner's identity is a trajectory that is constructed through "past, present and perhaps future aspirations of the student". Deanne describes her father as part of her learning network and as one 'who is always checking up on her'. Neil adds Bashar, Leo and Igor to his list of others who were helpful during his studies when we discuss his network diagram. Ricky brings his close friends into his confidence for assistance, Kevin and Eunach, who 'had a background of business, so they are quite knowledgeable on these things…'. These details serve as a reminder that learners are "located within educational institutions, families, socioeconomic groups, societies and cultures" (O'Donnell & Tobbell, 2007, p.315).

Selecting two of these 'blended learners' for review (Jane and Ricky), it is apparent that their practices help distinguish them and form part of their identity in transition to 'higher education learners', but that there are distinctive and detailed differences in their extended and personalised learning environments. The images below provide some visual data on the themes emerging with regard to the Go5 and summarise some elements explored so far.

Although not yet a complete picture (Figure 15), Jane's identity as a 'blended learner' is beginning to assemble here: she has a relatively wide circle of correspondents in the online forum, consisting of both 'inner' and 'outer' contacts; she predominantly utilises mobile and

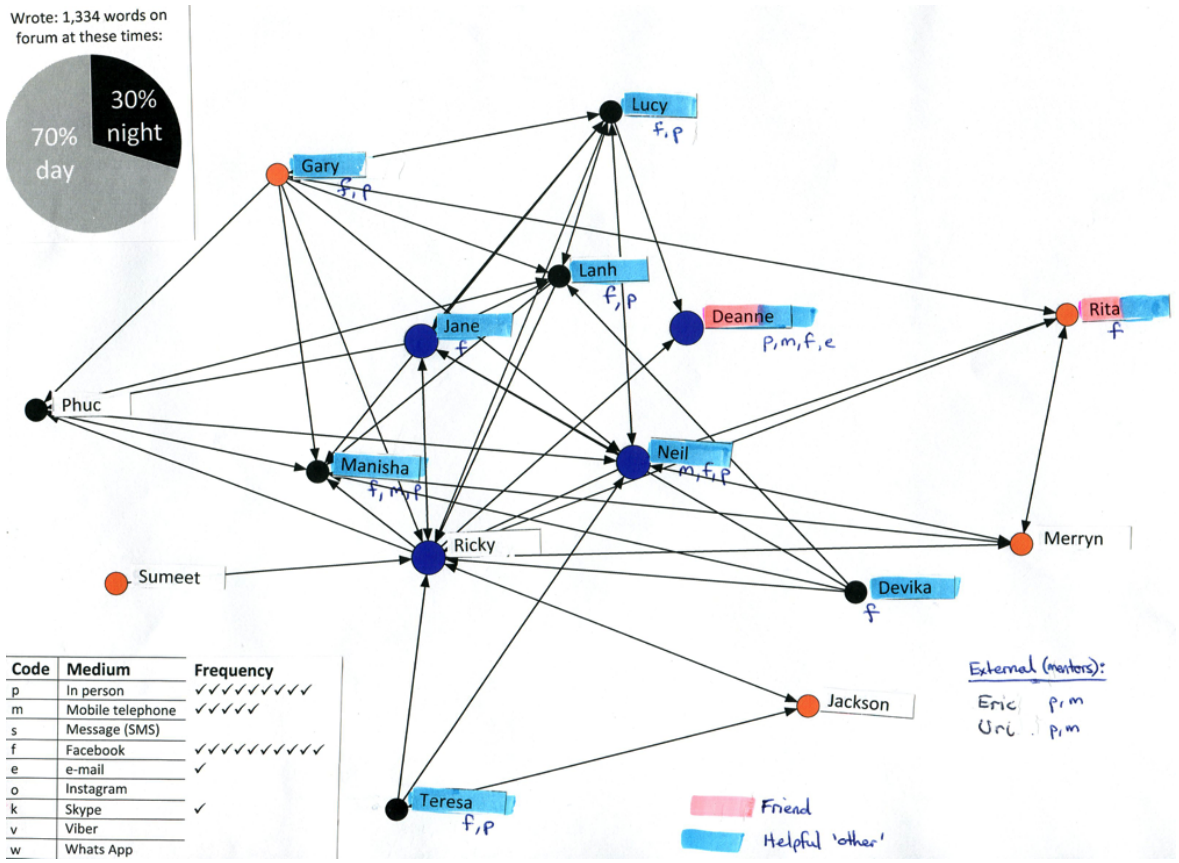
computer technologies to communicate with her peers but also prefers to maintain personal contact with them; she has a wider circle of two confidantes who become enrolled in her network as a learner; she shares a wish with her 'inner' group to achieve the best results possible for the course; she is a care-giver who must balance access to study resources.



Notes: The table in the bottom left (added later) indicates Jane's preferred communication mode based on codes she appended to names. The orange coloured 'nodes' are students from other tutorials (forum contact only).

Figure 15: 'Blended learner' Jane's extended network and media

Likewise with Ricky, though not yet a complete picture (Figure 16), his identity as a 'blended learner' is beginning to assemble: he too has a relatively wide circle of correspondents in the online forum, consisting of both 'inner' and 'outer' contacts; he predominantly utilises mobile telephone and social media (Facebook) to communicate with his peers but also likes to maintain personal contact with them; he has a wider circle of two confidantes who become enrolled in his network as a learner; he looks for others who might be able to help him and helps others in class and beyond.



Notes: The table in the bottom left (added later) indicates Ricky's preferred communication mode based on codes he appended to names. The orange coloured 'nodes' are students from other tutorials (forum contact only).

Figure 16: 'Blended learner' Ricky's extended network and media

Early distinguishing characteristics of blended learning start to emerge with the Go5. Particular, local and individualised practices hold each of the two networks in the sketches above together, though there are commonalities: they each draw support from trusted external 'outsiders'; their blended learning activity takes place both on and off-campus, day and night; they correspond with a variety of others in the discussion forum, building a network of helpful others who are 'serious' about their studies. From the outset, it appears that social and material practices are inter-twined in both digital and embodied forms. Affect and affective practice are also in evidence in the data. By affect, I mean "embodied meaning-making" and by affective practice, I am following "what participants do" rather than identifying lines of causation or character types (Wetherell, 2012, p.4). In both the classroom and the online encounters, affective practice described above sees: 'spirit' in the tutorial room, especially from Ricky; Jane and Deanne being 'serious' about their studies and therefore who they choose to associate with; Neil chatting with others and getting close to them through the LMS; and Melissa responding to others online when their posts went without responses. This group is 'caught up' in each other's blended learning practices. Even in a small group, the

complexity of blended learning networks is revealed here by the "linkages and connections of the body to other practices, techniques and bodies (human and non-human), energies, judgements, inscriptions and so forth that are relationally embedded" (Wetherell, 2012, p.140, citing Blackman (2007/2008)).

'The Benchmates': Mary, Merryn, Andrew and Aaron

The mixed modality of blended learning provides an opportunity for personal contact on campus beyond online encounters. For example, in the narrative above, Neil mentions his online correspondent Andrew ('I looked for him for two weeks until I found him'). Digital practices provide social connections to other tutorial groups, the source of the second group of interest in this Chapter. Andrew is one of four students forming a group who are taking Tracey's 1:00pm Thursday tutorial. There are various features of this group that distinguish it from the Go5: they are all Accounting students (the Go5 consisted of four Marketing and one Business Administration student (Neil)); they are all international students from two different countries in the sub-continent region (the Go5 consisted of two local and three international students[37]); each is learning in English as a second language (all Go5 members were English-speaking first language).[38]

What clearly distinguished this group from the other was the differences in their shared repertoire of learning practices – their 'ways of doing things' – both on campus and off in the digital domain. While Neil highlights Andrew as a 'friend' on his discussion sociogram, it is noteworthy that none of the others nominates their various alters (discussion forum correspondents) from the Go5 in this way.[39] I designated this group as the 'benchmates' (for reasons that become apparent shortly). The tutorial room for the benchmates is shown in Figure 17 below from various perspectives (these are contrasted with the classroom sketches of the participants further below). These images set the scene for further insight into the social practices of blended learning, while not excluding material practices: clearly, spaces and seating arrangements are in view.

Group members Aaron, Andrew, Mary, and Merryn help bring these practices to 'life' below.

37. The Go5 has a more diverse ethnic mix including members from: the Middle East; South-East Asia (2nd generation Australian); Africa; and the Sub-Continent.
38. The entry level IELTS standard for the VTC degrees in Business is 6.5. The second group displayed good listening and English-speaking skills when interviewed.
39. Andrew corresponds with Melissa on the forum, and Deanne corresponds with other group members Mary, Andrew and Aaron. Mary corresponds with Neil. Ricky corresponds with another group member, Merryn.



Mary's perspective



Merryn's perspective



Aaron's perspective



Andrew's perspective

Figure 17: Four perspectives of one tutorial room

From the sketches made by the participants of their interaction in the tutorials, social and material effects become apparent. Aaron refers to those adjacent to him on his sketch of the class:

> In the class … well these were basically my only friends, I basically did not talk to anyone else in the class, the only time we would talk to other people is during group activities.

Aaron's friend, Andrew, explains his experience after he draws on the classroom diagram, indicating an identity developing with his 'benchmates':

> So … even from living from 2009 I'm still having problem with the communication. Like …I don't really understand what the exact meaning – what [is] the exact meaning of that critical word, so I go and ask my friend, like … what was the exact meaning of that? So … that was the reason, so it was pretty much with my bench partners, and the most

> of the communications with beside the bench partner was these two girls [points to Merryn and Mary across the aisle], with the understanding of meanings, and what was the exact question…

Their location, bound by their bench (in the tutorial), and their social connection as 'bench partners' shows that this structured space provides opportunities for informal learning. 'Group activities' momentarily break and create social connections. A question from the tutor creates a peer-learning effect, introducing material practices including lateral, forwards and backwards movement. Merryn describes a different example of this movement within the tutorial:

> Well, me of course, I just love to go around with people and interact with people, even the silent characters. So I just try to build up a conversation with them; I come around and say "hi, how are you doing today?" Try to have a conversation so they actually talk to us.

Merryn suggests the material practice of movement in class while describing her affective practice – a love of 'going around' and interacting with people. Merryn's friend Mary sketched the interactions between class members in her tutorial group and described how small group dynamics lead to learning encounters and friendships both within and beyond the tutorial:

> Merryn is next to me, always next to me. I communicate a lot of things with her, other than … there was some guys, Ranvir, Andrew, Aaron, I talk with them as well about … not just in this subject, in every subject, it's helpful for me to pass the subject; all guys help me, they give their opinion to me, I give my opinion and my knowledge to them. It's really helpful and we build up friendship as well around this subject.

The sketches made by participants (Figures 18-21) show the movement of members in the small group described above – Aaron's 'benchmates'. The overall effect appears informal in contrast with the regular rows and screens in the photographs above. In contrast with the Go5, the benchmates recount more of their informal learning in places around the campus outside the tutorial, as Aaron explains:

Aaron Whenever we were asked a question … we, this was our group, and all quite we would always discuss a lot, and not only in the tutorials, we would discuss in the library, on the phone and uh … we used to do all our assignments together.

Tony How did they work, the activities?

Aaron The main problem solving … we did it in a group. We didn't care who gave the solution or something … it was always a group decision, stuff like that. Always, anything we would always do together. We never did anything separately, always together.

Tony You mentioned the library before?

Aaron We always used the library facilities more than studying at home. We've done a lot of studying in the library.

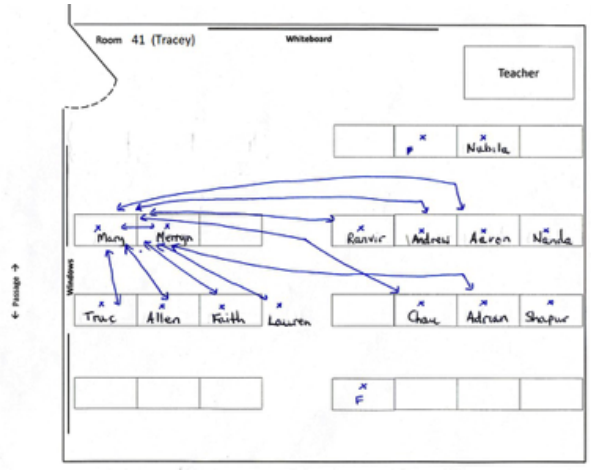


Figure 18: Mary's sketch of class interactions

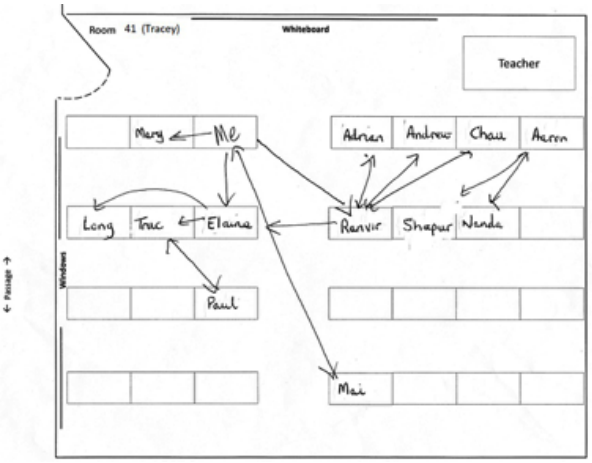


Figure 19: Merryn's sketch of class interactions

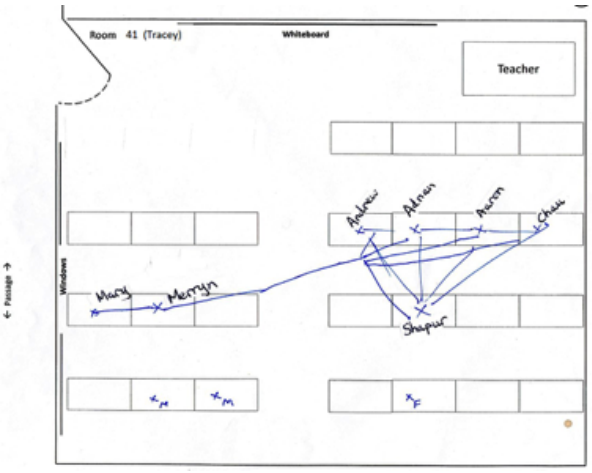


Figure 20: Aaron's sketch of class interactions

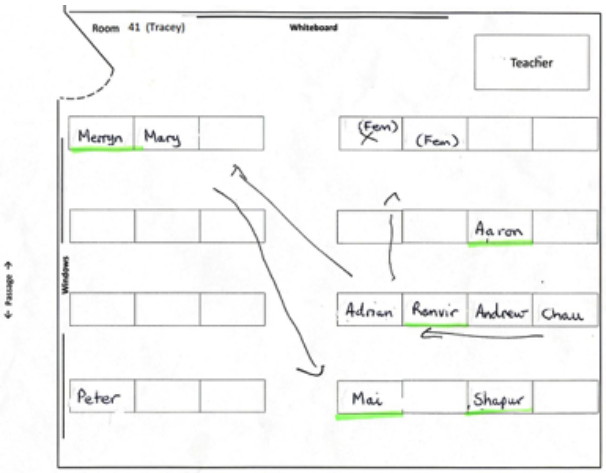


Figure 21: Andrew's sketch of class interactions

The questions raised in tutorial problem-solving and beyond are a situated learning practice brought into being through the blended learning environment. They are also an agent of, or actor in it; they enrol participants in it and mobilise it, moving it to other places. Mary's description of the cross-flow of activities in the tutorial room leads her to other places on campus that reveals how they are territorialised (Mulcahy, 2016) or enlisted as learning places

in an emerging social network of learning. For Mary, a 'benchtop' meeting outside provides the opportunity to gather more information or share some by asking or answering questions:

> My friend Merryn was usually with me. Normally we study in the library or sometimes we use the bench top near the Cafeteria, to explain some ideas … If I don't know something, there's something I don't understand, I ask Merryn, if Merryn missed some lectures or something like that, she asks me.



Figure 22: The benchtops near the Cafeteria where Mary and Merryn meet

Other places become sites of learning beyond the benchtop, hosting 'group work' and other activities involving application software, linking it to the library (Figure 23), a significant location that brings the network together. Merryn describes what happens in the Cafeteria (Figure 24) with the same small group from the tutorial that includes Mary:

> [in the Cafeteria] we had PowerPoint assignments, group activities, group assignments, and we used to use that area for group discussions and stuff like that, and obviously the library…so we just go to the library as soon as all of our classes are over basically we just go in and we log on.

In 'logging on', Merryn implies the importance of the digital library as a space in which blended learning occurs. As Gourlay et al., (2015, p.267) suggest, "instead of working in clearly-defined domains of the digital or the analogue, students create and curate dynamic, mobile and emergent networks which constantly combine and cross between digital and print-based practices, according to students' purposes and the surrounding contexts".



Figure 23: The library where the benchmates 'logon' outside tutorials



Figure 24: The Cafeteria where the benchmates do 'group' activities

Later in the semester – before an exam – the benchmates are in the library and decide to take a study room to work together. They occupy the 'large' study room (Figure 25) described here by Aaron:

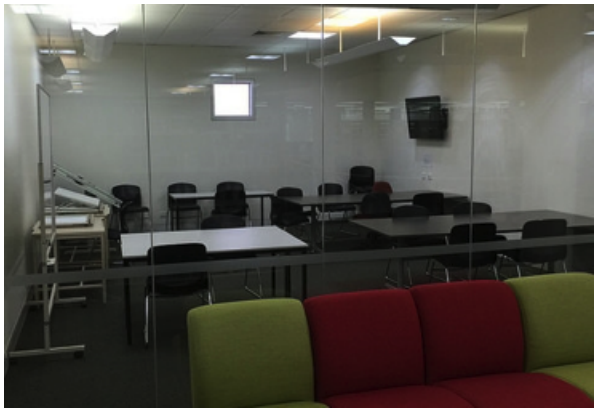


Figure 25: The 'large' study room

> People came in in the last bit ... they came and joined us. Everybody went into the room. Like, eight people. All sat together. Not only talking about business communication; some accounting, when we sat together it was better. We could ask ... any doubts we had.

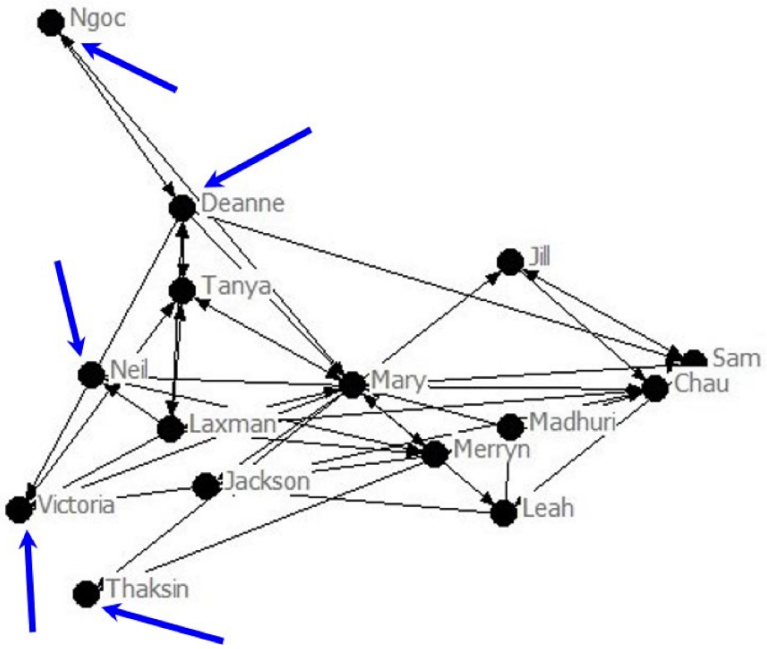
Here social learning comes to the fore – an opportunity to share with peers. Forming a study group and sharing knowledge about various subjects being studied signals a form of membership and helps build identity as members. In this case, the group extends itself by mobilising infrastructure (the study room) and other peers to prepare for their forthcoming exams. The group engages in a learning practice that establishes "who knows what", and "who is good at what" (Wenger, 1998, p.95).

‘We actually forced them on Facebook to join the group’: Blending social and digital learning practices

As a computer lab, the tutorial room enables class members to access the LMS to undertake learning tasks when they are not interacting with the tutor individually or in group activities (the LMS logs show that the three days on which tutorials were held – Tuesday, Wednesday and Thursday – accounted for almost 70% of LMS login activity).

The forum provides for the development of practices beyond the formal, structured learning tasks. It is a place where students might make contact to develop peer-learning networks. For example, Mary sees a need to develop additional friendships to assist her in the subject through the discussion forum. She explains:

> And here, some people I don’t know … Some people I met online in the forum, so I just send my opinion to them because I need to make more friends around this subject, that’s why I send some message … it’s only on the network, but it makes me happy! I’ve got internet friends.



This is the social network structure of Mary’s correspondents on the forum. Arrows indicate links to ‘people I don’t know’. (Note the appearance of Neil and Deanne here).

Figure 26: Mary’s online discussion sociogram and her ‘internet friends’

Mary’s friend Merryn lists her main way of interacting with her peers as by personal contact, mobile telephone and Facebook. She also finds herself drawn to the online discussions:

Tony (asking about a discussion post) This one is actually interesting because there's a lot of comments from you and I was interested to see where they came from.

Merryn Yep. This was actually my case study; first of all when people comment on my case studies on forums, I actually reply then. No, as in if they comment or ask a question, it's obligation only … it's our duty to respond and appreciate, yeah.

Tony So you feel an obligation?

Merryn Yes, if they ask a question then it's my duty to sort of come back and answer the question.

Merryn is enrolled in the discussion forum as a blended learning practice. The LMS draws her back to fulfil her 'duty'. Her 2,102 words in the discussion forums represent more than double of the average contributor; she reads double the average number of messages and posts more than four times the average. Merryn's immediate 'blended learning' discussion network gradually expands to 14 other students[40] as she participates in the LMS discussion. In so doing, Merryn becomes part of a network "of humans and things through which teaching and learning are translated and enacted" (Fenwick et al., 2011a, p.6). Merryn also develops a Facebook discussion group for the subject and invites those in her on-campus group to join:

> We actually had a group on Facebook. So basically Andrew, Melissa, Chi, Allen, I asked Ella, our whole group to join that; I created that group, so if there was any assignment work or something, we could discuss on that….We actually forced them on Facebook to join the group.

Social media is enlisted as an actor that can extend the learning network that subtends blended learning. Here, Aaron extols its value as an alternative to Moodle, citing the limitations of his smart phone as a factor influencing adoption:

> Facebook is the main communication mode we use for today. It's like people, we don't even talk to, we still talk to on Facebook. It's most easy, you can just log in … on your phone – It's very easy. But I couldn't do it on Moodle, it's actually tough to log in on your phone … The phone size … It's not so user-friendly. Facebook is user friendly, and WhatsApp is user friendly.

40. Others in the group had: 14 (Mary); 16 (Andrew); and 6 (Aaron) correspondents.

The mixture of the social and the material become more evident as Aaron continues, commenting when asked about using the smaller hardware format as a preference over his computer:

> Ah, usually with my studying I go to the computer, and when I'm talking to people I do it from my phone. And sometimes when I'm going through the train, I just … if there's anything urgent, emails and stuff, all the assignments … I've submitted many assignments through my phone… we had no internet at home, so I just sat on the train and just was scrolling through it. I sent it, the file to my email, then I just downloaded it and uploaded to Turnitin.[41]

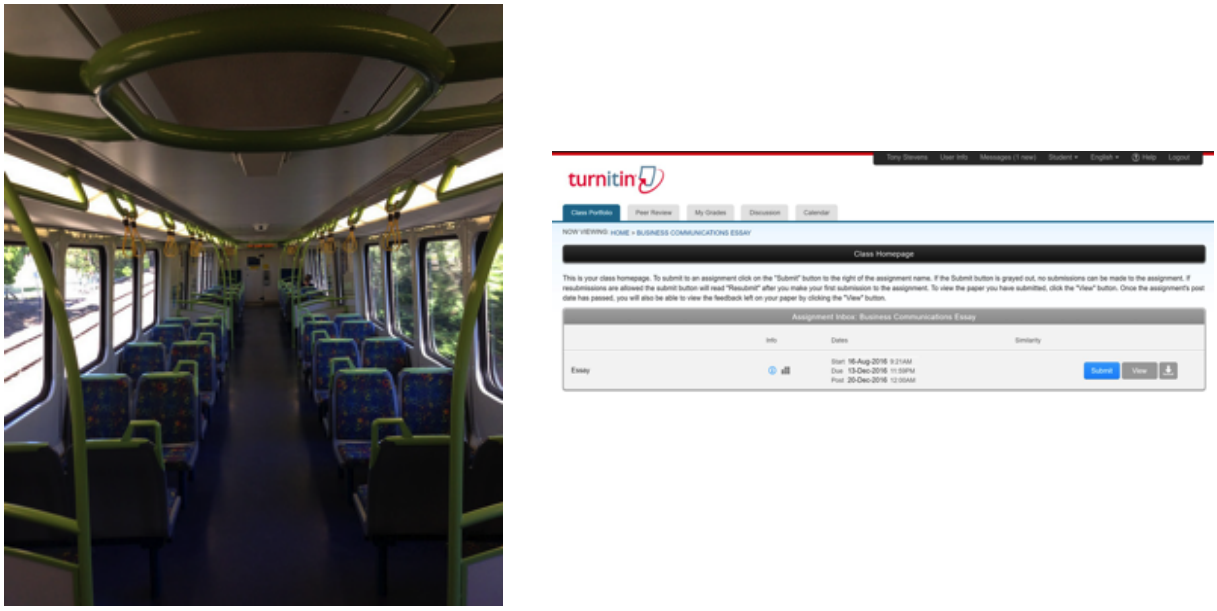


Figure 27: Aaron: 'I just sat on the train…and uploaded to Turnitin'

Elements of different blended learning practices are also evident in Aaron's description of what he saw as one of his 'achievements' on the course – an effective oral presentation. The unit outline required students to present in a particular style known as 'PechaKucha' (Pechakucha.org, 2016). Students have 6 minutes and 40 seconds to present on a topic drawn from the subject content. They are only allowed 20 slides and they must speak for 20 seconds to each slide. They are not permitted to use multiple or lengthy 'bullet points' on slides. Slides must progress automatically while the student is presenting. Aaron achieved a 7.25/10 for his presentation and describes the different practices involved:

> I couldn't speak to people before I did this course … I could not do a presentation on stage. Now I think I can speak to people normally. I had a presentation to do to the class. And we … the first presentation was in economics and we did it as a team. But

41. Turnitin is the College's online plagiarism-checking service software provider.

this one we had to do alone, that one was probably the first presentation I've ever done in my life.

Aaron is making the transition to a higher education learner, as a 'blended learner', as he demonstrates "competent participation in the practice" (Wenger, 1998, p.137). This and the other examples of practices cited above are difficult to reconcile with blended learning described as a simple split of online and face-to-face activity (Glazer, 2012). Even the "thoughtful fusion of face-to-face and online learning experiences" (Garrison & Vaughan, 2008; p.5) seems difficult to conceptualise as 'blended learning', since Aaron's experience in the passage above is one of many hybrid 'learning experiences' undertaken during the semester. Is it Aaron who has created this thoughtful fusion, made real by the practices engaged in his CoP? Or was it the educational designer(s) of the course? Are we to expect that blended learning can be 'engineered' this way?

CONCLUDING REMARKS

The encounters described above – mostly on-campus, but inter-twined with digital learning practices on and off site – suggest that the practice of blended learning is an "ongoing, social, interactional process" (Wenger, 1998; p.102) manifested in a variety of ways. In a sociomaterial view, idiosyncratic and emergent networks are created and maintained, consisting of a variety of physical spaces, texts and devices in constant interplay between the digital and the social (Gourlay et al., 2015). What appears to be a simple division between the humans and material artefacts is revealed as more complex (Bhatt & de Roock, 2013).

Learning practices: (1) are mobilised between classmates via online networks – both organised (LMS) and improvised (social media); (2) create shared histories of learning across many sites on campus and in different configurations: sometimes as an organised tutorial group; sometimes just two friends (Mary and Merryn) and sometimes in heterogeneous groups which form briefly for a specific purpose – for example, prompted by a forthcoming exam or presentation; and (3) cross modality and subject boundaries: a connection made in one encounter – digital or physical – might lead to others in different and separate subjects comprising the course(s).

Chapter 5

Enacting Blended Learning: Material Practices (+)

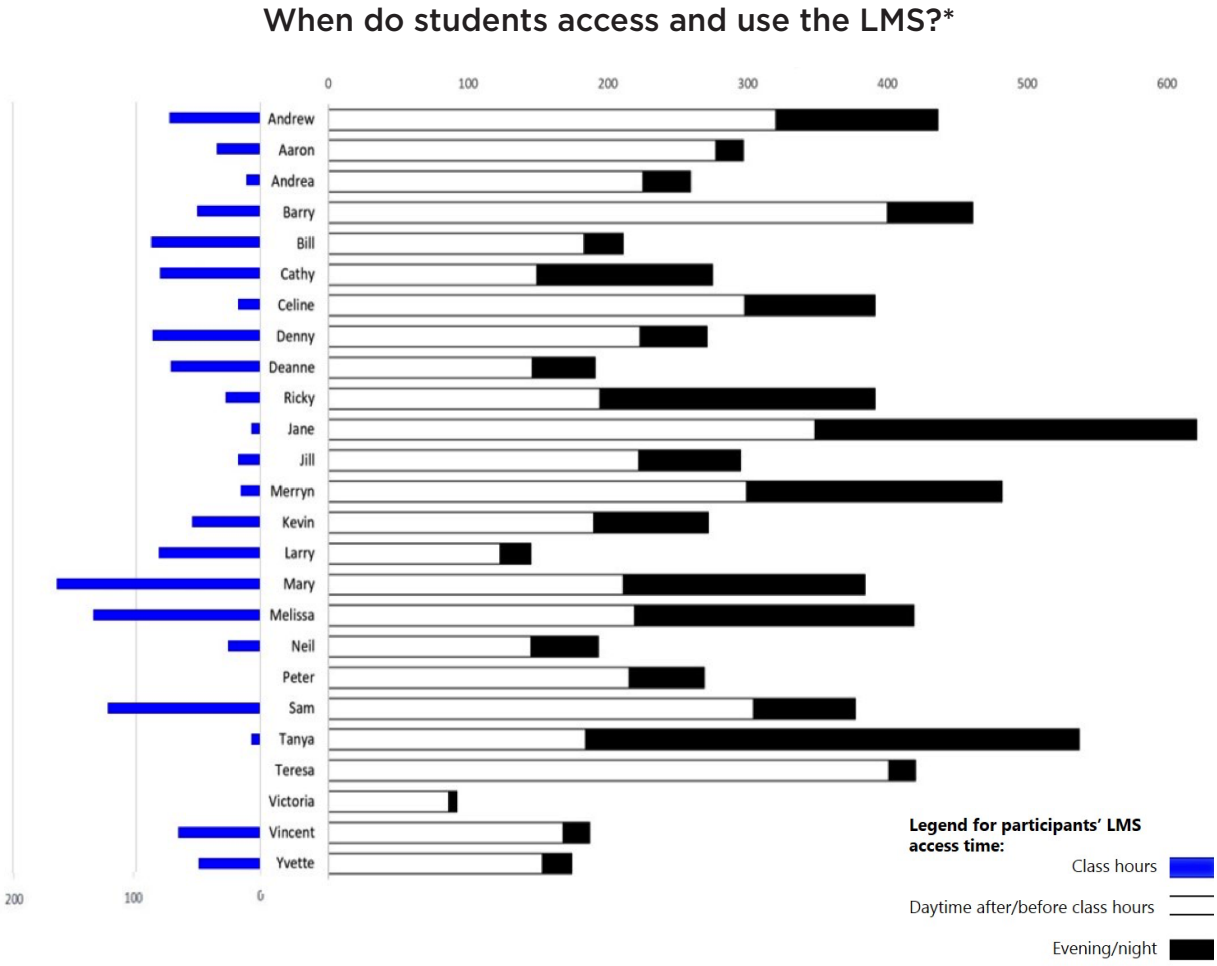
> *"Positive feedback will get under way as soon as one is able to muster a large number of mobile, readable, visible resources at one spot to support a point"* (Bruno Latour, 1986)

Commencing from the classroom, the previous Chapter lifted social and material-social practices up to view. In contrast, this Chapter follows material actors that have an important role in blended learning. They constitute a network that results in a "set of embodied practices that produce visible conduct" (Thrift, 2008, p.175), exemplifying blended learning in varied and sometimes unexpected ways. These practices also include the 'maintenance' that is carried out by some of the study participants to sustain learning relations. Altogether, I foreground four significant sets of material relations: (1) compatriots;[42] (2) notes that stick networks together;[43] (3) places that 'bind', and (4) the discussion forum in the LMS. These things create the material relations, which in certain instances, are particularly telling with regard to blended learning practices. Finally, I provide the background required to underpin the following Chapter which is entanglement-focussed.

How blended learning is materialised is central to this study. Figure 28 shows the salience of practices outside the classroom. It is clear from the Figure that the participants undertook most of their interaction with the LMS in places other than the classroom such as: at home; around campus; or while in transit to the college.

Some of the encounters described below involve students in the previous Chapter, however there are instances where I have chosen certain individuals who showed particular extremes in a learning event, for example, prolific or sparse contributors to the discussion forum. Where appropriate, I have given a brief introduction to new participants in the data stories.

42. I consider being a compatriot a material effect of nationality and the act of meeting another individual(s) who is/are likewise, rather than a socially constructed 'characteristic' of a particular individual.
43. This seemingly odd conjunction is explained further below.



* Note: The events are total numbers of activities on the X axis such as logging in, reading or posting in the forum, taking a test or accessing a learning object.

Figure 28: Contrasting times of LMS access and usage

Compatriots

MEETING IN THE FORUM

The discussion forum is a space that provides an opportunity for 'meeting' compatriots. An embodied practice that plays out in a digital space, the familiar reach out to one another in the forum, well-illustrated in the exchange below (Figure 29) where three compatriots, Bill, Delia and Chelsea 'meet' online.

In this study, blended learning practices are produced with a foreign language and country in-common (recall that English is a second language for 76 percent of the participant sample). Knowing someone from the 'home' country created the opportunity for the type of learning encounter (in the forum) described here by Neil:

> I think with Melissa as well, because we come from the same background, she's in Europe, originally from [Middle-East], and when I heard she was from [Middle-East] I thought we have something in common, so … she helped me a lot with the essay as well. "Introducing myself" [in the Forum]…yeah, that was a long one. I never wrote so much on myself …

by Bill - Wednesday, 29 August 2012, 4:22 AM

Hi my name is Bill, and I am from [sub-continent]. I have completed an advance diploma in Accounting and I am hoping to complete my degree in Accounting next year.

==========

Re: Bill
by Dehlia - Wednesday, 29 August 2012, 4:28 AM

Hi Bill,
I'm Dehlia. I'm also from [sub-continent]. nice to meet you.
thanks.

==========

Re: Bill
by Chelsea - Thursday, 30 August 2012, 8:23 AM

Hi Bill
Hey its me Chelsea and I am from [sub-continent] too. It's always nice to meet someone from my own country. How long you have been studying here in VTC?? You just started here?? I have been studying here for almost 1.5 years but yeah I think I haven't meet you before.
Looking forward to work with you in future. Think you doing the same subjects and I'll see you around the uni.
Bye for now.

Figure 29: An exchange on Discussion Forum 1

Another group consisting of four students, Larry, Chandana, Chatuni and Shanta, all from the sub-continent met to study together in sites around and off campus. Learning configurations emerged around these compatriots because they were able to share knowledge both in Business Communication and in other subject areas. Larry shares knowledge with the others when it is *'confirmed* knowledge – this is *correct*'. He describes how they meet in the library and use a discussion room:

> Uh … because, ah, four of us, myself, Chandana, Chatuni and Shanta, we used to, ah … study as a group, because all of us are from one country [in the sub-continent]. Four of us have a little … kind of an expertise in different subjects. I like taxation, he[44] likes communication, she likes basic accounting, she likes management … if all four of us are in the learning commons we used to get a discussion room.

Knowledge building and identity practices hold this network together: other subjects; 'confirmed knowledge'; or 'introducing myself'. A relationship might also develop through a third party from a 'home country' while mixing with friends in other subjects. Shanta is a

44. Gesturing to his discussion sociogram.

member of Larry's group – she shares a relationship with Deanne (from Chapter 4) who is in another tutorial group:

> Joan was in two of my classes, and she was pretty helpful with two of my assignments. And we had Leo's class together, so that was a pretty close class. [Shanta] was probably the closest of my friends because I knew her back from home. She went to school with my sister. So she would come over and we would study.... She's probably my closest friend here.

These encounters suggest affect in *effect*: a kind of 'emotion as motion' (Thrift, 2008, p.175). Blended learning networks are formed and held together through material relations produced as an effect of compatriotism, the social moment and the emerging learning experience.

A SMALLER-SCALE COMPATRIOT-HYBRID NETWORK

Peter is a mature-age student from South-East Asia who is a member of the same tutorial as the Go5[45] from the previous Chapter. His learning encounters involve translating languages and negotiating meaning with his peers, a small group of compatriots and with Rohit, an 'outsider' from a different country of origin (Figure 30). While on campus, he meets with three friends from the tutorial and discusses assignments:

Tony How did you go about doing your work, your task [in the library]?

Peter Just with my own language.

Tony That's interesting, so ... you spoke in [SE Asian] yourself to Thao, and to Cathy, but to Rohit?

Peter He doesn't talk ... Because they speak [SE Asian] at home ...I can understand ...

Tony Were they kind of making the material available to you, to understand what was happening and what people were saying on the course?

Peter Yeah, so usually they ask me about the assignments ... Because when someone asks ... I know how to do that. So when I work in my language, I know how to do this work, I work on the book ... and then I go and I compare to them.

45. Jane, Melissa, Neil, Ricky and Deanne

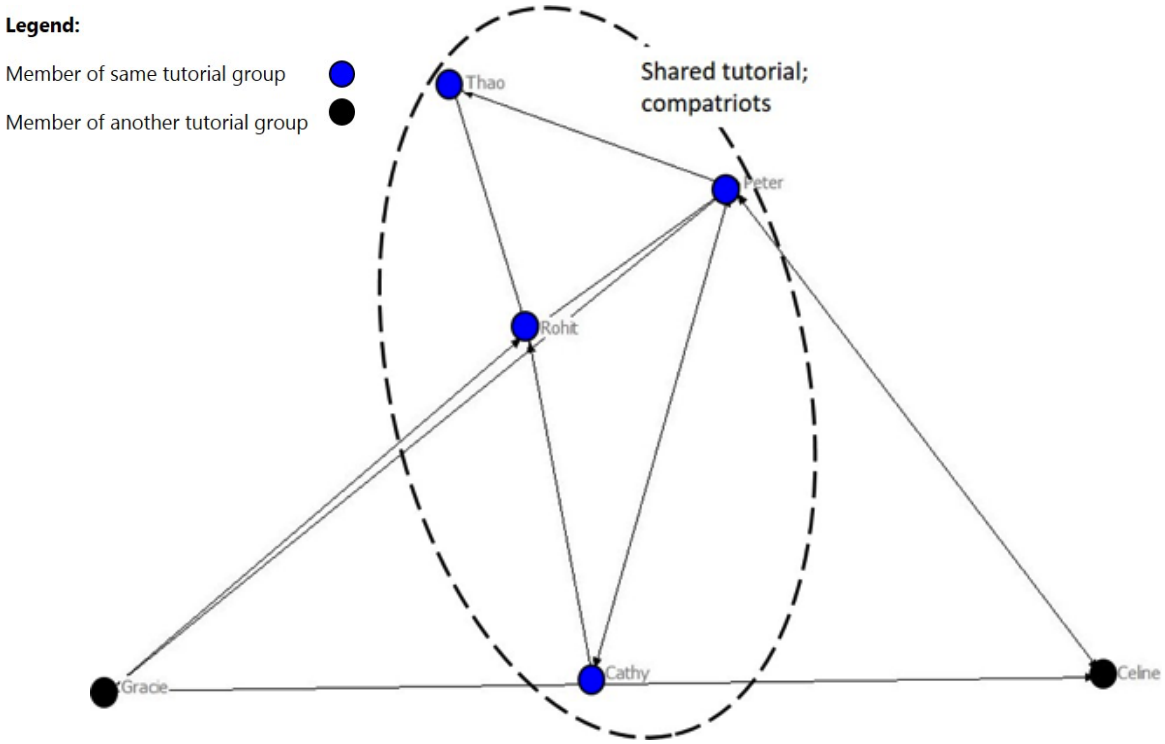


Figure 30: Peter's discussion-compatriot network

Peter also works with various software applications to gather meaning from the readings in the course material. Here, he describes how he goes about transferring meaning from one material object to another and back again[46] so he can eventually post his response in the discussion forum:

Tony — Now what about the discussions, because we looked at the list of discussions earlier?

Peter — About this one? Agreed with the article, with what they say, I agreed in my own language... then I changed from own language to English

Tony — So you would take, say this material, convert that back to [SE Asian], give your answer in [SE Asian] and then go back to English. Tell me about how that worked.

Peter — I think in my own language, then I can write ... I use Google [Translate], but maybe it's wrong about grammar ...

Tony — So did you use another program like Word?

Peter — Yes, this I use as well as Google. Yes. It helped me with my grammar. Because of the ... well, I don't know if it's wrong or right, I use Word, try it, it 'does' for me.

46. Translation in its commonly understood form.

Peter alludes to the 'vitality' of a word-processing programme that can 'do it' for him. His blended learning practices involve both application software and his personal notes, which he reviews each day on the one-hour tram ride to the college (Figure 31). 'Blended learning Peter' partially comprises: compatriots, a computer, a group of peers' discussion posts, word-processing software and its grammar function, Google Translate, the internet, a native language (SE Asian), a second language (English), a trip on a tram, his notes and his embodied thoughts. The use of notes is a material practice that is significant for this study as several learning encounters developed around from notes. These are described further below, where I also consider the burgeoning collection of blended learning materials, "driven by what is possible to combine" (Thrift, 2008, p.155).



Figure 31: Peter spends an hour each way travelling to and from college on the tram where he reads his notes.

Notes that make networks 'sticky'

Paper and the notes placed on them is an original and enduring technology that created material relations of various kinds in this study. Paper and its associated notes served as a kind of network building 'material'. Notes are a form of immutable mobile (Latour, 1986).[47] A range of blended learning practices materialised around notes is described below.

Melissa drives to the college from home for classes and takes her notes along, stating that 'if I'm at a traffic light I'll have a look at them' (Figure 32). She pauses later in the car park and goes over her notes again. Merryn (Go5 from the previous chapter) reads her notes on the train and bus. While working in the small group in the Cafeteria, she finds technologies like

47. An immutable mobile in the form of colour swatches was originally described by (Latour, 1999) in a study of field observation undertaken by a group of scientists. The swatches were an object that enabled a 'reliable' interpretation of the unfamiliar (in this case, soil samples). I use the term here to mean notes that are created by students that are portable and translate the learning objects and tasks of the course through tutes and lectures, enabling the participants in the study to combine the notes across various environments and situations.

the smart 'phone distracting, stating: 'I'm more just onto the paperwork'. For Andrea, notes were sometimes associated with food and eating: 'we'd just go over our notes in the canteen while we were eating, quickly' (Figure 33). Notes signify competence to Barry.[48] Referring to his social group and describing how one of the members always had her notes handy, he says: 'that's why I respect these guys'.

In an era of 'cloud storage', smart 'phones, tablet devices and learning management systems, notes, it seems, still have currency and a certain material agency in blended learning practices.[49] Each of the 'notes practices' described above suggests different combinations of the materialisation of blended learning: notes are a simple, transportable, and handy prompt for Melissa; notes anchor Merryn's participation in a small learning group where the digital is a distraction; notes enable Andrea to share food and learning with others; and notes embody competence for Barry.



Figure 32: Stopping at traffic lights. A place where notes might be reviewed momentarily by Melissa.



Figure 33: The Cafeteria. For Andrea, a place to eat quickly and review notes. For Merryn, a place where group work can be done, but technology distracts from her 'paperwork'.

Another illustration of notes at work as an 'immutable mobile' involves Deanne and her friend Shanta. Deanne designates herself and Shanta a 'study group' that later has unexpected material consequences for herself, Shanta and other students:

Tony So would that be a study group, just you and her, or were there others in a study group?

Deanne No, just me and her. Actually, for Business Communication, I had done my short notes before, so she wanted to study with me, so that when I was

48. From Grace's Tuesday 3:00pm tute.

49. Notes take the form of what I would characterise as 'personalised inscription devices' – they actively participate in blended learning.

with her she'd photocopy my set, and then there were some of her friends as well, they all photocopied my set of notes, then I ended up doing, like a tutorial class with them. (laughs) Because I had already finished studying buscomm, it was a Saturday and I had just gone to give my notes to her and I ended up teaching a class.

Tony (laughs) How many people were there?

Deanne There was about … maybe five people. So they had their set of notes and we would go from chapter to chapter to chapter. (laughs)

Later, the learning encounter between Deanne and her widened circle extends to other subjects, where she blends learning with teaching her peers:

Tony The group that you ended up helping…. It's almost like they ambushed you.

Deanne They did! (laughs) And after that they just wouldn't leave me alone. Oh my god, every subject! Even like marketing and stuff, I wasn't even doing it. I was glad I had my notes.

Tony (laughs) Did they? Other subjects? You'd learn a lot.

Deanne I did, I did, because when I was explaining to them about communications, I had already studied but I had to revise anyway. So I was going through the notes and cues and everything, so I kind of revised as well, then after that I didn't actually need to look at the notes.

THE WIDENING WEB OF PEOPLE AND THINGS: COMPATRIOTS, NOTES AND TECHNOLOGY

These encounters suggest a widening web of people and things where the opportunity to learn from peers supplements the LMS, the discussion forum, and the classroom sessions. These are embodied practices that bring blended learning into being. In contrast with the illustrated networks in the previous chapter (Figures 15 and 16) showing technology used, friends and 'helpful others', the illustrations (Figures 34 and 35) below show how another and different kind of learning network emerged for Deanne and Peter. Figure 34 below shows Deanne's discussion forum network from Chapter 4 (de-emphasised), with tutorial peers, and the other material relations described above: a set of study notes, another subject being studied with a friend, and compatriots.

The classroom, her peers and a range of other actors form together to bring about blended learning for Deanne. Study notes and revision meetings before exams participate in the development of learning in a material way for Deanne and must be considered as another – and inseparable – element of the practices in blending learning with technology. ICTs are also present and help maintain this emerging network. Deanne maintained correspondence with others in the 'group of five' detailed in Chapter 4 (p.71): 'Look yeah, we'd text, Ricky would call, Melissa would always text, because we had some presentations and things together'.

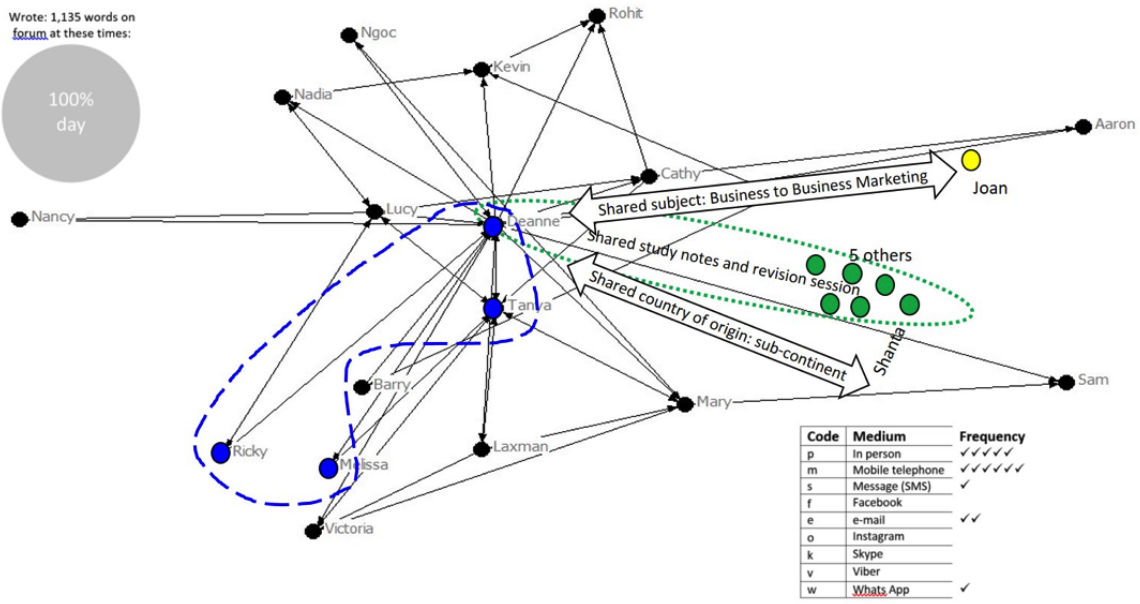


Figure 34: Deanne's developing blended learning network

Peter's expanded network is illustrated in Figure 35 below. It contrasts with Deanne's in several ways, highlighting the heterogeneous nature of practices in different learning networks which materialise variably as blended learning. Deanne has relatively many contacts; Peter has few. Of Deanne's many contacts, only three from her tutorial correspond with her in the forum; of Peter's contacts in the forum, three of the five are from his tutorial. Deanne contributes more than double the number of words to the forum compared to Peter. Peter relies mainly on personal contact between his classmates to develop his learning practices; Deanne's media environment includes: a mobile telephone, email and other communication applications such as What'sApp? Peter reviews physical notes on public transport travelling to college; Deanne drives.

Compatriots, study notes and an experienced 'outsider' all form part of the networks of Deanne and Peter (one outsider is a friend, the other a sibling). These relations enable blended learning networks to form and hold together in both instances. Newer technologies such as Google Translate or What'sApp? also enable these networks to come into being and be maintained.

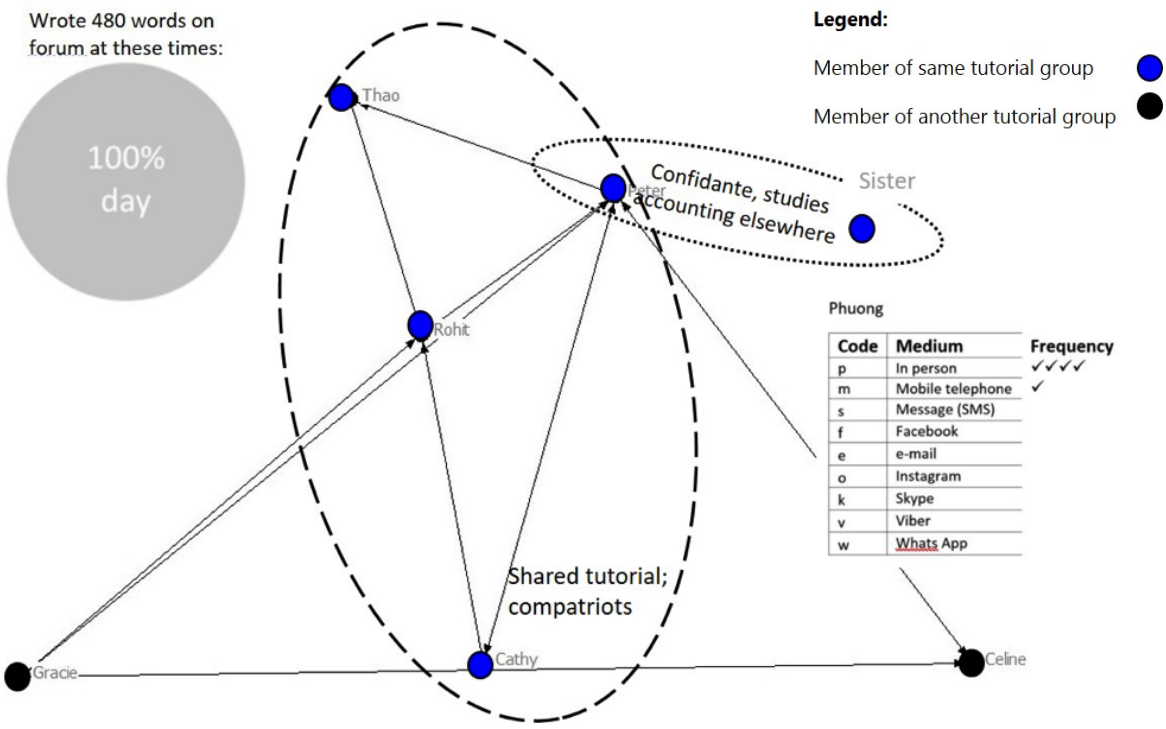


Figure 35: Peter's developing blended learning network

Places that bind

Participants were 'drawn' in some cases to a location that was more consistent or conducive for their learning needs like the library – even over the comfort of home – as Andrew explains:

> So it's for the discussion or pretty much practicing for the slide presentation, because in home you might just seem funny presenting yourself in the room … or someone might listen, as being in a separate room as though you're talking to someone, might find it very funny … so … I pretty much prefer to come into the library and practice for the PowerPoints.



Figure 36: The library: a 'better' place for Andrew to work on his presentation

Larry describes his encounters on campus, signalling the emergence of a network of blended learning practices: 'We spend time in a discussion room, sharing, sometimes just one subject, sometimes all the subjects. I'm not usually studying in the learning commons, but when it comes to assignments, I interact with a lot of people'.



Figure 37: Small discussion room

Larry meets with the small group in a discussion room (Figure 37) to discuss various subjects, including Business Communication. They move beyond Campus when their access to the library is closed, like a 'learning caravan', taking their notes, books, and devices with them:

Tony 'Anywhere else that you could meet or interact?'

Larry 'Probably the Macca's (McDonalds fast food chain).'

Tony 'Macca's across the road, yeah, that's interesting.'

Larry 'Yeah. And because it's 24 hours, because the learning commons closes at nine, sometimes if we're not going to finish our work by nine, after they close we all go to Maccas.'



Figure 38: Maccas

The library, the small discussion room inside it and the fast-food chain across the road are all part of the production and maintenance of Larry's blended learning network. Other, smaller groupings emerge, for example, Jane and a friend: 'You know, there were times when I was having lunch with a friend and I would invite them to the private study room, you know, to maybe have group studies'. Melissa used the 'big area in the library' to work with a small group revising before exams: 'before the exam, yeah, we'd be asking 'do you know what this is', we'd repeat it and I'd know what we're talking about. It made me feel comfortable about it'. This form of embodied meaning-making illustrates the emergence and development of small-scale, localised and hybrid learning networks that characterise blended learning in this study.

The availability of a room creates a learning opportunity for another group (Aaron's). When they are in the library studying for exams, the opportunity presents for his group to expand and join together, exemplifying another form of embodied knowledge practice:

Aaron We always used the library facilities more than studying at home. We've done a lot of studying in the library. And before every exam we used to take the rooms, the big room … [Figure 39]

Tony Like a big study group?

Aaron Yeah, it was a very big study group. Everybody went into the room. Like, eight people. All sat together. Not only talking about business communication; some accounting, when we sat together it was better. We could ask … any doubts we had.

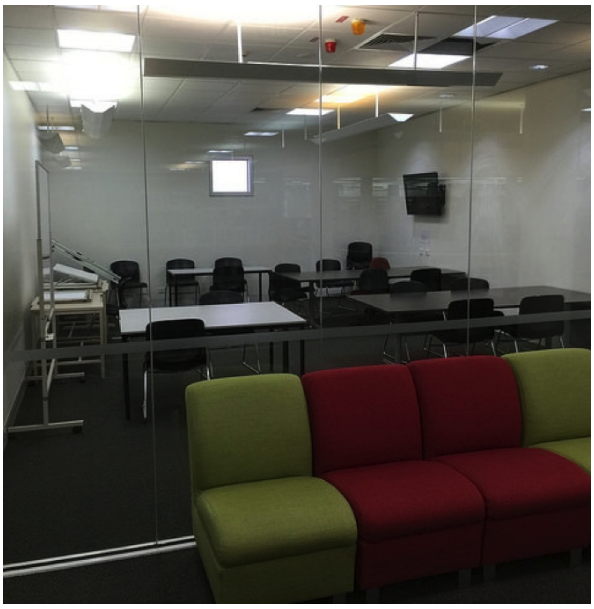


Figure 39: The large study room

The blended learning practices described above suggest that bodily 'possibilities' have become entangled with meaning-making and other 'material figurations' (Wetherell, 2012, p.19). The digital environment of blended learning creates the conditions that prompt participation in group work when the opportunity presents itself, especially on-campus for these participants. Melissa's experience indicates learning embodied through rehearsal – question and answer – with her friends, resulting in her being 'comfortable' with knowing something.

The Discussion Forum

This section explores the place of the discussion forum in blended learning practices. In addition to the forum's role within which learning tasks were set, certain blended learning networks materialised. Participation in the discussion forum is mandated[50] through the course design: students are required to participate in order to gain a pass in the subject.[51] In the first instance, participants introduce themselves. Students take a role in the learning community as postings build over time, with the result that certain participants engage in enrolling others in the practice. The discussion forum becomes a stabilised web of relations that, as I go on to explain, has a variety of material effects, materialising blended learning.

Table 5 below expands on the data provided in Table 4, Chapter 4. There is more activity on the first two discussion topics as students acquaint themselves with each other ('Introduction') and participate in an assessment item ('Post a Literature Review'). The

50. The discussion forum is an obligatory passage point in the emerging network(s) of blended learning.
51. In Chapter 6, I explore the concept of 'users' (in this case both students and tutors) being 'configured' to learn in a particular way through the LMS (Woolgar, 1991).

number of messages posted, responses to those messages (threads) and 'views' of items is suggestive of engagement by the participants,[52] though it does not necessarily mean learning has taken place, as some discussions taking on a more social character may have many exchanges (Baran & Correia, 2009).

Item	Introduce yourself and respond to a reading	Post a literature review and discuss	A case study	Design an exam question (2)
No. of discussions	105	79	55	47
No. of threads	339	291	119	143
Thread depth range (low-high)	0-12	0-15	0-10	0-11
Discussion item 'views' (1)	1558	1477	524	695
Average item views/ student (3)	19.5	18.5	6.6	8.7

Notes: (1) Based on LMS report data; (2) This forum was used in conjunction with Google Docs so 'view' data is dispersed between two tools – only forum data shown; (3) Item 'view' data is diluted because forums allowed for subscription, allowing students to view posts via e-mail without logging into Moodle.

Table 5: Detail of student forum activity by discussion and thread counts

The social environment of the tutorials described in Chapter 4 suggested the network-building effect of 'competence' and 'taking things seriously'. The discussion forum also provided for a set of digital relations that, as I go on to discuss, served to materialise blended learning. For example, Jane finds herself drawn into an exchange:

Tony Okay, so this is the last one to see if you can recall …

Jane Yeah, this one was the one where I started following the criteria for the discussion, and I just realised that he … I thought I'd done mine perfectly but when I read his I realised, I learned something looking through his, he'd actually done something that I hadn't and included more.

The discussion referred to above by Jane involved a case study with set questions. The exchange took place over a two-week period and involved three students in all, consisting of five threads. Blending learning involved the case from the textbook, the discussion forum, the learning materials from the course and the criteria set by the tutors for what constitutes a

52. No claim is made here about whether students are more or less engaged (for example see Wegmann & Thompson, 2014). My aim is to explore the socio-material practices of the participants and the role of the discussion forum in both this section and the following Chapter.

'good' discussion post. A truncated version of the discussion between Jane and the student she refers to above is included below at Figure 40.

Case Study: A Discussion Activity -> Insightful -> Re: Insightful
by Jane - Wednesday, 12 September 2012, 11:26 AM

Exceptional work.
Well researched, backed up with referencing from the text book, 100% appropriate use of quotation and examples. Beautiful layout, thoughtful and complete addressing of all colleagues. Is there anything you haven't included? hehe...
I am satisfied you have fulfilled all criteria to a 'T' for a forum discussion topic. Even providing a personal opinion with definition. ..... Truly well done.
Just a little thing, is it necessary to include full referencing for a simple forum discussion? I'd love to hear more from you on the forums and any feedback you have for me.
==========
Insightful
by Leigh - Wednesday, 5 September 2012, 04:01 PM

Hi All
Listening involves marketing a conscious effort to hear, to pay attention (Bolton, 1995).People love to talk and they always welcome an audience. Use their need to help you become a more thoughtful, insightful professional. So, are you a good listener?
My answers for the Case study:
After Kono, Tim would think that he maybe expect too much from Leigh and he already done a good report, that's enough. All he needs to do is to improve his knowledge and engrossed in the project.
After Latika, Tim would feel helpless, lost and even guilty. He would doubt his ability to contribute to the team.....

Figure 40: Jane and Leigh's forum exchange

This exchange illustrates the relations that form over time as both the scholarly and social exchanges combine to produce a learning encounter for both participants. For Andrew, the criteria set by the tutor have provided a form of 'inscription' that enables him to make sense of how to lay out a case study. This, in turn, is transmitted via the discussion forum to Jane, who, in turn, comes to understand via the assignment criteria and Andrew's posting how to undertake a case study, modifying her learning that had originated from her own post on the forum. This illustrates a network of emergent learning activity in which materials (the subject outline, a case study from the textbook), embodied activity (thinking and creating a post, then a response) and ICTs are 'blending learning' together.

BILL: LURKING OR WORKING?

For another encounter, I selected a student who was not so prolific in his participation (Bill) to provide another sample of 'close up' practices in the discussion forum. Bill's practices suggest that even a 'minimal' contributor became enrolled in this actor network.[53]

Bill was in Grace's Tuesday 3:00pm tutorial. He describes his use of digital devices during his time on campus as limited. His contributions to the online discussions totalled 471 words. In his discussions, he has a limited number of correspondents (three – see Figure 41 below).

53. In the previous chapter, I described Jane's activity in the forum. Amongst others, Jane was a prolific contributor.

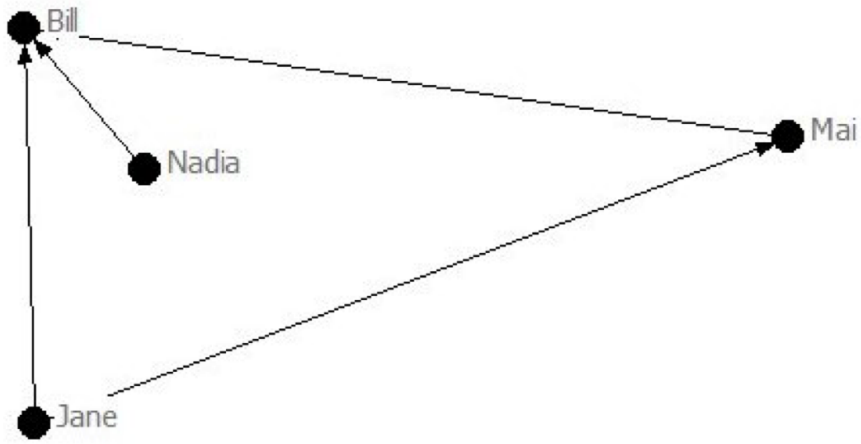


Figure 41: Bill's Discussion Forum Network

Bill prefers personal contact with those from his tutorial group on campus. Indeed, Bill lists no form of contact other than personal meetings with others during his time on campus at VTC. This is not to suggest disengagement – Bill's activity log shows that he reads more than the average number of messages when compared with other class members. He states that he prefers to 'study alone in the library' and elaborates here on how he uses the forum:

Tony You had an above-average number of 'reads'; tell me a bit more about what you got out of it.

Bill Yeah, I always read them to get ideas ... I'd jot down the ideas that made sense to me. When it came to creating the question or writing down my essay for the exam; from the ideas I got from the other people that made sense to me, I tried to expand on them, I created my own essay.

Tony How was that working?

Bill I was actually copy and pasting their comments and statements into Word, all of them, say ten, onto Word, then I'd eliminate four or five ... then, from those ideas and from my own ideas that I'd had, I'd try to expand and write down an essay, write a paragraph that makes sense to me ... that's how I used to work.

In an analysis of Bill's forum behaviour, he might be considered a 'lurker' (one who doesn't contribute but uses the content or exchanges between others to learn). The term is pejorative, but might simply be a learning practice for Bill. Like the learning affordance of the library ('Most of the time when it comes down to studying by myself it's always in the library'), the discussion forum has the effect of creating space for Bill to engage with the learning material, but at a distance and in a way of his own choosing. In this encounter, the software,

the discussion forum, his peers' posts, and the forthcoming exam bring Bill's learning into effect. Yet as one who preferred personal contact to mediated discussion, Bill acknowledges how the forum helped him: 'Yeah, I think it was very helpful to us, it was a good thing because if we didn't have that … it would have been harder for me to get information from others, and … That's about it.'

Further illustrating the role of a discussion post as an immutable mobile, Bill, one of the least prolific writers in the forum, later comes in contact with with Jane, one of the most prolific, through his posting of a suggested exam essay topic (Forum #4), made late in the semester. Jane responds in part the following day, referring to his post:

> the question is both ideal and VERY well set out. You must have put a lot of thought and effort into this Bill?? Just superb!! Its clear, simple and importantly interesting enough, that I'd want to write on this topic. I'm glad I read this. Hope you do very well.

Maintaining the network

Understanding how others go about their learning tasks creates different relationships for Melissa through the forum. It also provides for maintaining learning relationships, either by appreciating or encouraging others:

Tony So tell me a bit about how you used the discussion board itself.

Melissa I used it especially to look at the literature review and the essay, I sort of just read how everyone structured theirs, and the points that they made, and how theirs were similar to mine and we were all talking about the same thing, but the way we structured it and talked about it was different…. and I basically just used it to read what everyone else was writing, the points they were making and just encouraging everyone.

Being 'connected' through the forum also enabled other students to benefit from Melissa's contributions. Though she states that she mostly replied to her friend's discussion posts, she also responded to others that she did not know: 'well, just to encourage them, well, I felt bad for them, some of them had no responses so … so I would sort of respond to them, give them a bit of feedback'. Both affect and technological affordance constitute the relations that form blended learning practice.

The forum also links different participants across other tutorials. Here, Barry from Grace's Tuesday 3:00pm tutorial, describes interactions with others, in Roger's Wednesday 2:00pm tutorial:

Tony Have a read of this. And then think about what was going on.

Barry For these guys, and girls, I think I kind of wanted to be there because they're very uneasy in class. Um … they're super organised. So when I came to class they had the book, they had all their little … notes and whatnot, but speaking to others and actually getting it out there… they just wouldn't actually present anything or speak to anyone. So I thought if I give them a little nudge, and they see a compliment or whatever here and there, they might want to start actually contributing more… Yeah. Yeah. That was pretty much some of the only reasons that I would post for these guys here

Having become enrolled in the blended learning network, Melissa and Barry bring other parties into 'line' by responding to their posts after 'feeling sad', or by feeling and acting on the need to 'nudge' quieter participants

CONCLUDING REMARKS

This Chapter has examined how learning networks are formed through a heterogeneous mix of human and non-human actors. Different mixes of technologies 'perform' blended learning practices as ongoing processes of "performative materialist enactment" (Fenwick & Edwards, 2014, p.42). One feature of the formative networks emerged from the context of the VTC environment, namely the diverse mix of nationalities forming the student cohort. Relationships between compatriots emerged in class and online, and were maintained through the various digital and embodied meaning-making practices of the participants.

As learning networks emerged sociomaterially, the role of what might be considered 'mundane' or older technologies such as notes became visible. Notes appear in mobile practices, social spaces (such as the Cafeteria) and in study groups. Technologies (old and new), places (formal, informal and off-campus), cultural affiliations, social interaction (embodied and online) coalesce in a sociomaterial view of blended learning. Deanne's identity as a blended learner shows that it is comprised of inter-woven material practices. There remain aspects of these sociomaterial practices that require further uncovering – for example in the lecture and the library – a task I turn to in the final data Chapter that follows.

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Chapter 6

Blended learning in-the-making: The classroom and beyond

"What really exists is not things made but things in the making" (William James, 1909)

While the two previous Chapters provided specific attention to social and material practices of blended learning, this Chapter complements these sets of practices and introduces new material that is used to expand my conception of blending learning. I consider that to study 'blended learning' reifies the human and the material as being separate in learning practices. In contrast, 'blending learning' can be better understood as an ongoing, highly varied, and open-ended set of sociomaterial practices and effects. In the first section, I focus on what teachers as actors 'do', that is, their part in teaching practices such as the lecture and the tutorial. While the role of teachers is seen as the face-to-face element of the 'blend', I go on to show that these actors also form part of a much wider and heterogeneous network of blending learning. To further illustrate this, I have also selected institutional technologies[54] as another actor – a material one that is caught up in 'blending in-the-making'.

Further, in the preceding two Chapters, I 'storied' certain enactments of the sociomaterial practice of blended learning that can be deemed 'successful' examples of building a network of blended learning. In what follows, I aim to lift up to view what this success is built on and arguably, what it excludes. Success in a blended learning network is not necessarily success for all, as I briefly go on to show. The choices made by blended learners – the practices that are adopted and those that are not – is a theme that I will take up in the discussion chapter. Here, I will 'tilt' towards this theme by working some empirical material and raising questions that I aim to address more fully later.

In considering blending learning practices in this chapter, my intent is not to generalise content, or, discuss what 'makes' blending learning, but rather to *particularise it further*. This is a journey that goes not from "the particular to the general, but from particular to *more* particulars" (Latour, Jensen, Venturini, Grauwin, & Boullier, 2012, p.599, original emphasis). Starting from where the students first encounter teaching staff – the lecture – in the following section, I re-frame it as a network of co-produced blending learning practices that takes shape before, during and after the 'teaching event' (lecture).

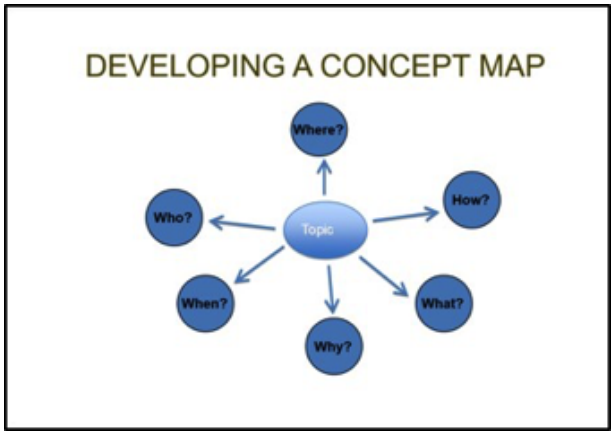
54. Although the ICT network and the LMS would be viewed as typical institutional technologies, I extend their definition to include certain other elements.

The Lecture: An Expanding Network

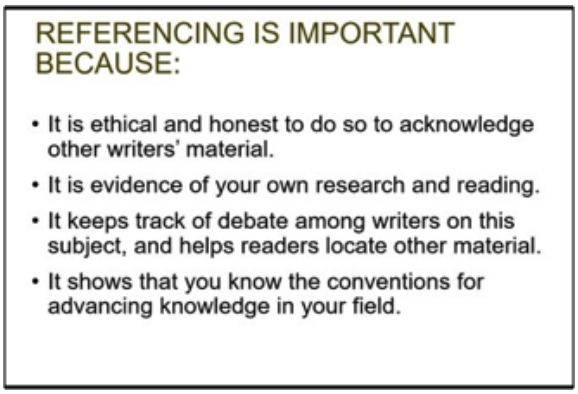
Like a trend noted elsewhere in higher education presentation (Gourlay, 2010), multi-modality[55] is a feature of the lecture slide sets presented in the Business Communication 'courseware'. This feature of blended learning is also noted in the literature, and is considered a lower-level or 'simpler' application of technology blending (Jones, 2006).



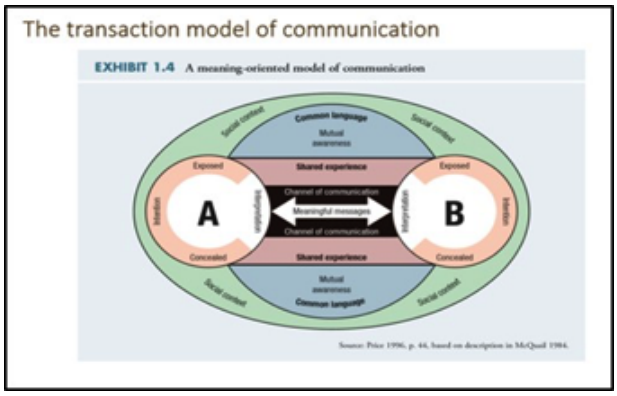
#1 A Week 5 slide (interpersonal communication skills)



#2 A Week 7 slide (academic writing)



#3 A Week 7 slide (academic writing)



#4 A Week 1 slide (communication theory)

Figure 42: Sample slides from those 'most downloaded'

Figure 42 above shows samples of the most popular slide sets downloaded from the LMS. These slides have their own hinterland, having been 'brought in' from the prescribed text (Archee, Gurney, & Mohan, 2012), then adapted in various ways based on academic and professional practice (see Figure 42, Panel #1). Slides are 'knowledge inscriptions' that are mobile and durable. They form an important element of the blended learning practices presented below.

55. The use of speech (a 'lecture'), visual aids such as slides, internet-based learning resources (for example learning objects on the LMS or links to web-based activity 'sites') and video.

The lecture is a material practice that is performed with "bodies, talk, text, bytes, machines, [and] architectures" (Enriquez, 2011, p.44). The lecturer makes points on the slides about the weekly topic in the lecture room (see Figure 43 below) – a blended learning practice. The social aspects of learning from the lecture commence before it and continue afterwards. Victoria explains that she and her friend 'were always talking before the class, after the class and before the lecture'. On the train before the lecture, Mary reads: 'some lecture notes and books, especially with business communications, you need the text books'. The area outside the lecture room (Figure 44 below) becomes a place to meet others and to talk, as described here by Jane: 'there have been other people that I got a chance to speak to, like Floyd and Ricky, and I got to be friends with them, like outside of the … during waiting for class or something'. These 'un-scripted' encounters are a form of "embodied meaning-making" (Wetherell, 2012, p.4) in a kind of linking practice between the many other locations of blended learning: the classroom, home, public or private transport, and online.

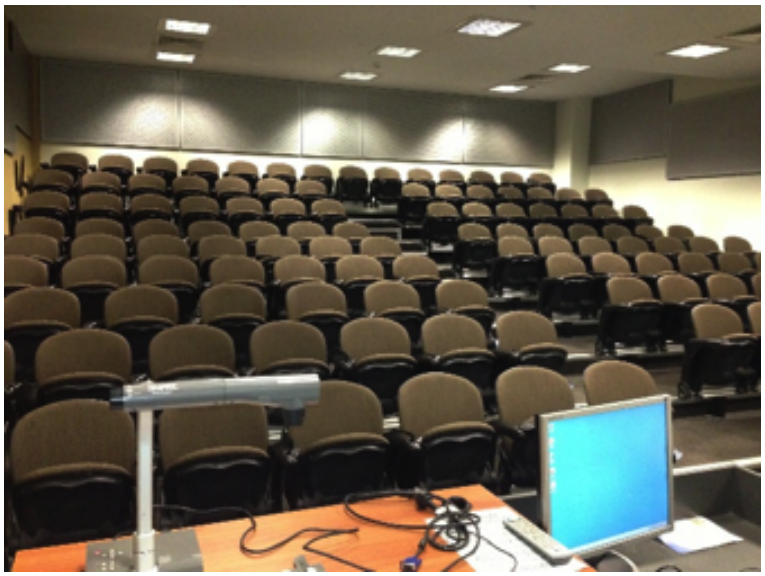


Figure 43: The Lecture Room: a case of 'simple' blending (?)



Figure 44: Outside class: a place to meet and talk

Encounters emerge from other lecture-related spaces. Here, Larry 'follows-up' with others from the lecture: 'Because I … I attended most of the lectures, I know all the students enrolled in this subject, so whenever I saw someone in the library, if I have a pretty good question regarding the subject, I will go straight away to talk to them'. The time after the lecture allows for a less formal set of practices that bridge the digital practices and the teacher-led learning enacted on campus. For example, Mary and Merryn (two of the Benchmates) would meet and discuss what happened if one of them missed a lecture. These practices extend to finding out about what happens in peers' tutorials, for example, Barry talks to Teresa: 'We talked pretty much every Wednesday, after the lecture. Um … but she (Teresa) gave me an insight on how

good her tutor was, I guess I was kind of comparing what we were learning to what they were learning'. 'Catching up' can be considered an affective practice, making blending learning a *continuation* of sociomaterial practices, not a division of classroom and digital practices.

The lecture was also a place to make friends – for example Melissa meets Jane: 'that's how we met. We sat in the same place every time'. Getting to know others from the Business Communications course also happens in lectures for different subjects (like Economics), for example, as Merryn describes: 'With Floyd, he's just a very unusual, unique guy. During lectures he'd reply and ask questions, and we'd get to know things we didn't know about Australian economics. We're new here, so we get to know new things'. Knowing new things and new people is enmeshed in and forms part of the lecture. Though a lecture is ostensibly a place where representational knowledge transfer takes place, in this study, it enacts embodied relations somewhat akin to those of a 'town meeting'. The affective practices in and around the lecture might be considered a "site of intensity" (Kennedy & Gray, 2016, p.424) where lively, embodied, situated communications take place (Wetherell, 2012).

Lecture slides and 'simple' technologies

The material elements of the learning practices mentioned above – the slides – though perhaps considered a 'simple' technology-in-use application, are material objects that perform different 'blending' depending on the circumstances. In the lecture itself, they bring a 'hinterland' with them which is the 'body of knowledge' related to business communications. The lectures are replete with terminology and theories presented in a reified form: Slide #4 in Figure 42 above being one of three 'communication theories' presented in the first week of classes is a case in point. As a representation of the knowledge 'contained' in a lecture, the slides then become a popular download from the LMS. Jill states that she 'often reads the PowerPoints' directly from the LMS while at home studying. Downloading and viewing lecture slides is a material practice that might be carried out in the tutorial (discussed below), the library, at home, or elsewhere, and on mobile telephones, tablets, and computers. For example, the recorded lecture podcast becomes part of Larry's blended learning practice, as he listens quietly and learns:

> If there's any podcast versions of lectures I download it on my computer, sometimes put it on my phone, sometimes put it on my iPod and just listen. I'm not really focused on doing anything, just listening. I think that's working for me.

Lecture slides re-appear at different times and places – bedrooms, trams, trains, and the library – and in different formats – printed and digital – translating different forms

of representational knowledge for the participants. The topics set for the presentation assignment described in Chapter 4 by Aaron ('this one we had to do alone, that one was probably the first presentation I've ever done in my life') related to the weekly topics from the slides, for example, computer-mediated communication; listening skills (see Figure 42, #1); or models of the communication process (see Figure 42, #4).

The podcast of the lecture extends the lecture presentation onto the LMS, making it accessible at any time and on different platforms. The lecture is "an expanding network that exists over time and space" (Mifsud, 2014, p.144). The lecture slides appear to function (perform themselves) as "immutable mobiles" (Cook & Balayannis, 2015): they circulate rapidly and easily through the LMS, retaining their identity; they 'show' the participants the knowledge content for the course; and they can be easily reproduced by printing. Later, the slides 'make their way' out of the lecture and into the tutorial[56] to continue the blending teaching and learning practices.

Tutorial or 'Lectorial'?

The slides from the lectures for the complete course and several individual weeks were popular downloads from the LMS. The chart at Figure 45 below shows the ten most popular learning objects and downloads from the LMS (after the quizzes and discussions, which themselves made up the top ten most accessed items on the LMS). Tutorials became an opportunity to renegotiate the meanings taken from the fragments of the lecture: the slides, podcasts, discussions before or after, or notes taken. For example, in Roger's tutorial, Cathy explains: 'normally we would talk about … what to study in the lecture, and we … he'd explain about, tell about our lecture'. For Celine, forum postings in the LMS by silent class members are like digital footprints to be followed to their embodied owners later in class:

> I think reading other's [posts] gave me what they think; otherwise in class they might be quiet. So when we had the workshops we kind of had people that would sit in the sides … Trying … when you'd ask questions they'd try and get away from it. So you'd see what they were thinking without them having to put their hand up and give an idea. I thought that was really good that you could understand what they were thinking.

The practice of posting and its link with the tutorial illustrates that blending learning is a *co-production* of the digital and the embodied. The digital and the embodied are entangled or caught up in each other. Here, the posting takes the form of embodied thinking. This practice shows blending learning as a distinctive, 'hybrid' set of practices compared with say, forum posting in a purely online course.

56. Log files show that slide sets are downloaded during tutorial class time.

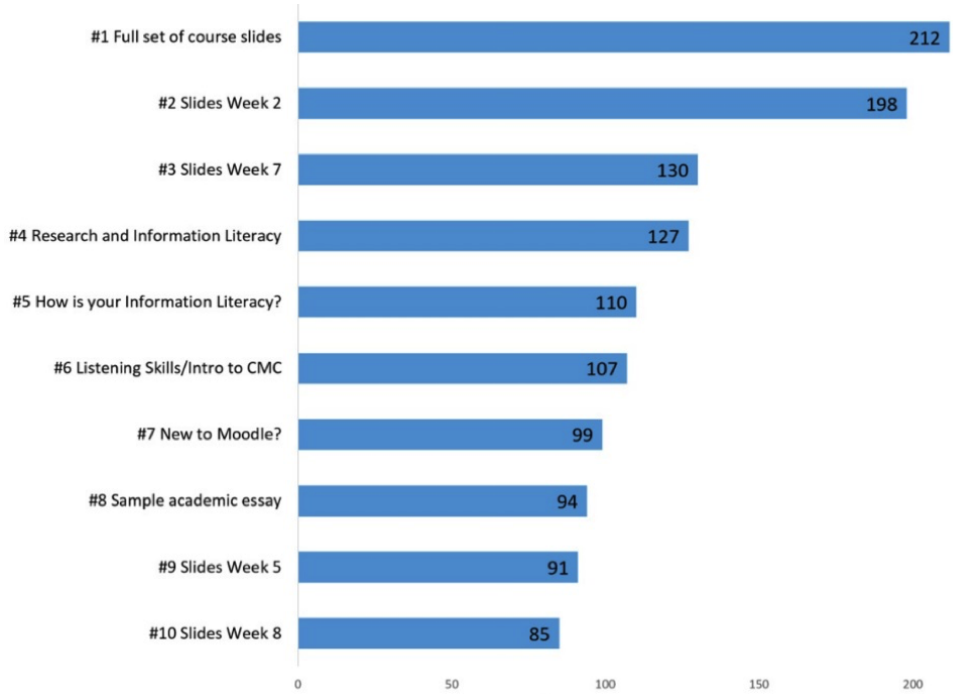


Figure 45: Top 10 learning objects accessed/used by students in the LMS[57]

Differences in practices emerged in each of the tutorial groups. This depended on the level of tutor-led dialogue in the class, or the extent to which an individual tutor might set practical exercises. Barry sketched out how he saw the class interactions from his perspective in Grace's class, (Figure 46 below), noting a marked level of tutor-led dialogue, perhaps more characteristic of lecture-style delivery.

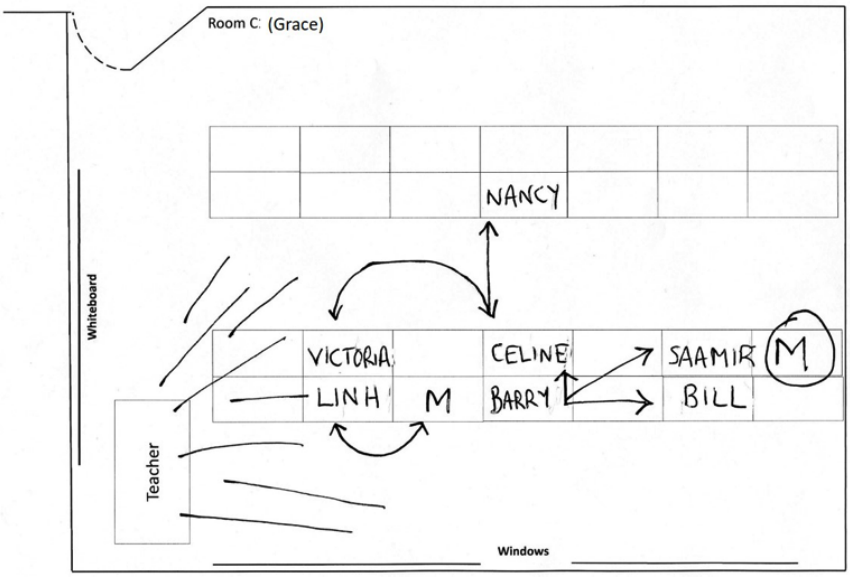


Figure 46: Barry's impression of classroom interactions in his tutorial

57. Items #4 and #6 are learning materials 'embedded' in the LMS with access to text-book-like information, external links to video and online activities. Item 5 is a link to an internet-based self-evaluation quiz.

The level of tutor-led interaction and discussion in different tutorials is reflected in the LMS access statistics from the tutorials in the study, shown in Figure 47 below. Having a different tutor results in a different 'blend' of learning relations between classroom, discussion, and technology, emphasising the situated and contingent character of blended learning.

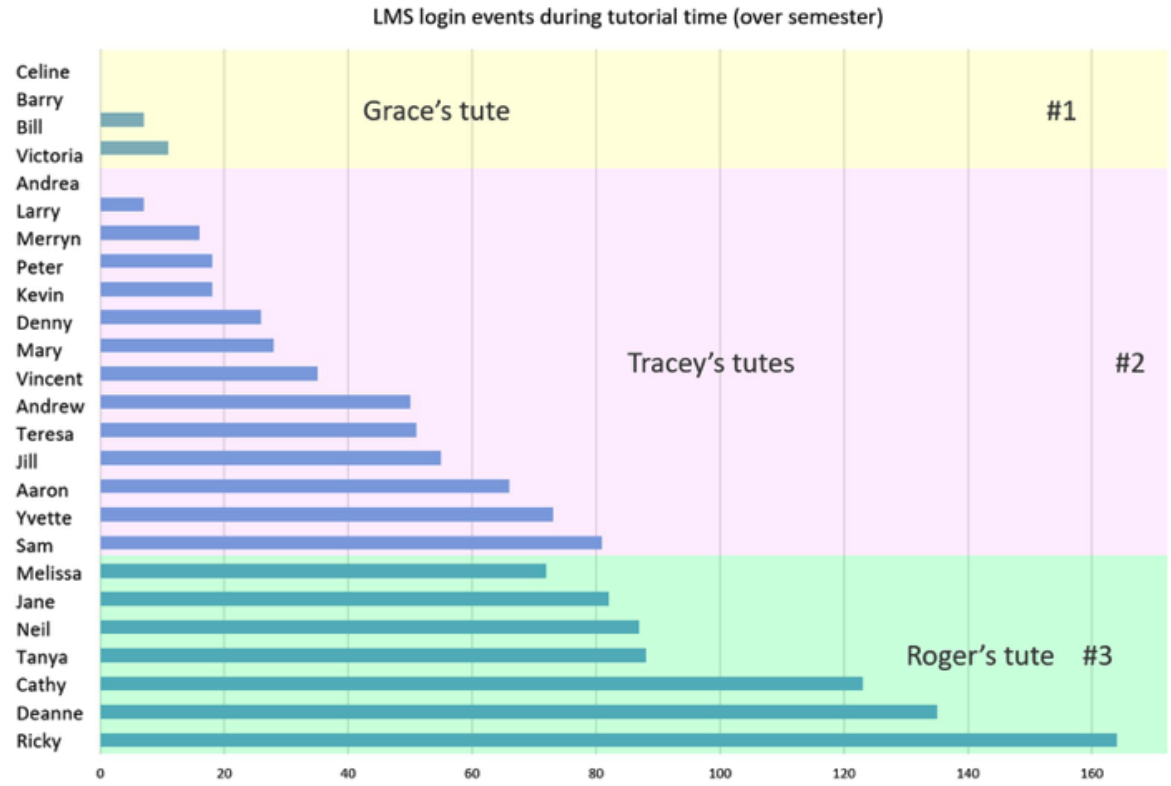


Figure 47: Login events ordered by individual tutor

Other contrasts in teaching (blending) practices became apparent in the data. For example, in Tracey's tutorials, videos were used via the LMS (reported by class members Jill and Yvette). Participants from Tracey's groups showed a higher level of in-class LMS activity too (Figure 47 Panel #2 above). Group activities created social connections, providing the opportunity for learning practices. As Merryn commented, 'I just love to go around and interact with people, even the silent characters'. These learning practices initiated by both the tutors and the students (in particular see Ricky, Merryn and Neil in Chapter 4) are affective practices that are situated and connected, building a blended learning network that is "contingently thrown together in the moment with what else is to hand" (Wetherell, 2012, p.13).

In Roger's tutorial, a different set of practices emerges, more around the LMS (Figure 47, Panel #3 above). In Chapter 4, Melissa described 'go(ing) up on the computer and do(ing) it', for example with images on the lecture slides being used in conjunction with a class exercise like a discussion. Neil explains his own experience of the lecture and tutorials:

> Yeah, so it's kind of like fun to be in the tutes as well, you interact and with people and that's how you study. Because it's all from your logic and how you see things from what was explained to you in the lesson. And I love, I really love the lectures, and Roger – he explains stuff in a fun way, you know what I mean?

Like the lecture, the tutorial becomes a site of embodied meaning making – movement in class features prominently, especially with Ricky and Neil. Ricky also describes how Roger blends the forum discussion with in-class activity: 'We pretty much got to revisiting the forums, looking at them, giving opinions on what other people have written'. The teacher, students and technology come together as a network of embodied and digital 'doing', producing blended learning as an effect.

The employment of the LMS in Tracey and Roger's classes (and to a lesser extent Grace's) suggests that their own teaching practice is shaped by the availability of resources in various digital formats within their classrooms. These settings of the LMS "define and delimit the user's possible actions" (Woolgar, 1991, p.61).[58] A quiz acts as an obligatory passage point 'opening the door' to class resources.[59] There are multiple choice quizzes in certain weeks that must be attempted: a 'rite of passage' to 'competence'.

Teaching practices emerging from the lectures and the tutorials produce many different effects, and are themselves an effect of the teachers, the technologies, the Faculty and the 'body of knowledge' constituting the course. For the participants, they create a highly varied set of effects, with some practices 'bleeding' into others, for example the lecture-tutorial (lectorial) mix with its human and non-human bodies assembling in different contexts, places and times. Moves to define or classify blending by percentage of online versus in-class delivery (Glazer, 2012) become hard to 'square' when the practices are viewed this way. Yet there are other, and more complex layers to the blending practices to be seen. Thus, in the following section, I introduce and turn analytic attention to 'Institutional Technologies'.

Institutional Technologies: Bundling the Blended

Willingly or unwillingly, other actors, human and non-human (like the college Wi-Fi network), are enrolled into the relations formed. For example, while on campus, Aaron likes to stay in contact with one of his mentors, Allan: 'When we have a lot of credit, I call him, and when I have no credit I call through the wireless network here'. Accessing the journal databases for research was another obligatory passage point, an institution-level technology that helped to

58. It is important to note that both the tutor and the students are 'users' in this regard.
59. Informal 'practice' quizzes were always open; formal assessments were conducted on the LMS in class time.

configure blending-learners, needing to comply with the 'academic rules' (see Slide panel #3, Figure 47, above). For example, in the library, described here by Neil:

> For my presentations in modern economy, I used the learning commons, and also when I had to do the essay I had to get the articles out, I mostly focused on the articles I got from Proquest, and um … I forget the other one. That's in the learning commons. And I also use the library for a calculator.[60]

The role of the library in forming blending learning practices is evoked in Merryn's description of what the Benchmates do after a class: 'so we just go to the library as soon as all of our classes are over basically we just go in and we log on'. In contrast, Jane finds that she 'got the best studies out of the private rooms'. So too did Bill: 'Most of the time when it comes down to studying by myself it's always in the library.' It is clear here that the library performs a complicated network of people, analogue and digital resources (Gourlay et al., 2015).

A practice-based way of seeing the role of the library contrasts with the idea of technology 'blends' being higher or lower impact based on the 'mix' of in-class and online learning (Alammary et al., 2014). Using a sociomaterial relational way of considering blended learning awakens us to the idea that entities (technology/humans) do not pre-exist, but that they materialise 'intra-actively' in their practices (Barad, 2003, 2007).

The library – an institutional 'technology' – goes beyond being a physical space or 'container' for action (Mulcahy & Morrison, 2017). It invites embodied connections, like Larry's group who move to the 'big study room': ('I like taxation, he likes communication, she likes basic accounting….') or individuals like Celine, who likes to get 'in early', walks 'in with all the others' and sees 'what others (are) up to'. In the preceding encounters and those described below, the library emerges as a place of embodied meaning making where the practices of blended learning are co-produced outside of class, both online and face-to-face. The practices are shaped by what facilities the participants like (or are compelled) to use, the subject specialties, and the social bonds that form during these entanglements of technologies and people.

Starting out as a useful place to go into after class and 'just log on', the library creates situated meanings (Swist & Kuswara, 2016), becoming valued by participants as they get to know it in various ways (Tuan, 1977). Learning is enacted within the library in various sociomaterial ways. For example, Teresa, when asked about her home 'learning environment', reports that she does not have a desk at home:

60. It is likely here that Neil is referring to using a computer to access common spreadsheet application software for calculations in other subjects such as economics or accounting, though this practice was not probed at the time of the interview.

Tony Oh, okay. Oh no!

Teresa Most of the time I'm at the library. Most of the time I'm on the computer. When I'm at home I'm on the computer.

Tony Is that a laptop?

Teresa Laptop, yeah.

Teresa's blending learning environment outside of class seems mostly comprised of an institutional technology (the library 'complex') in which she uses a portable technology for her learning tasks. Although she is on the computer 'most of the time', she talks to several other participants on campus: 'I knew Ricky before we started, so it was easy to interact, and he's new to commerce, so I'd stay a bit longer … and with literacy I'd go to him for questions … and with Neil, he's chatty, he talked a lot, it was easy to talk to him'. Teresa also joins the Facebook group. Coming to campus becomes a productive exercise, especially towards the end of the semester when she catches up with Bill: 'We talked a lot before the exam, like I don't understand this, do you understand? type of questions. Um… and just general information about topics'.

Others, like Andrea who doesn't go to the library much finds herself drawn there: 'when I need to do group assignments and stuff … the library would be the best place'. Cathy meets friends in the library 'because we have different locations, very far away'. Celine travels a long way (one hour's drive) to get to VTC early because she 'hate[s] being late, and hate[s] seeing other people late':

Tony When you get here, you're early; where do you go then?

Celine So then I go to the learning commons, and then sit and wait for the computers to turn on; a good 10-15 minutes. I get here pretty much as soon as they open. Walk in with all the others.

Tony Did you meet with others?

Celine Yeah, there were a few people that might come in around, say eight thirtyish, so we'd have a chat, see what they were up to … If they were on course …

The library including its (sometimes slow) technologies participates in forming learning relations on several levels: it forms part of a planned study activity with others who live 'far away'; affords a chat with others to see where they are 'at' with their studies; links a pair of

peers, one valued by the other as a worthy study partner[61] and a small group that becomes larger, moves and eventually 'outgrows' the opening hours.[62] At a broader level, though each of the small groups described above has formed in different ways. Like the 'Benchmates' in Chapter 4, these successful blended learning networks are an effect of: physical places (the architecture), social dynamics (learner-friends), and digital technologies (hardware and software). In the case of the library, they find it a good place to study. There is a "tight relation between the behaviour of individuals, their environment and artefacts, as well as their social community" (Swist & Kuswara, 2016, p.103).

The nature of blending learning for human actors begins to present as a bricolage. Human participants here are 'relational bricoleurs', using social and material relations at hand in their sense-making activities. They engage with whatever knowledge practices present themselves – social and material together. These practices compose a network of digital and on-line and campus-based face-to-face practices. This might involve someone else's notes, someone else's forum posts, Google Translate, lecture slides on a smart 'phone – and include whatever context arises to meet their 'knowledge production tasks': a growing meeting in the library, the train journey to college, a discussion in or before class about 'progress', or as I go on to show below: a bed that 'kills' (Rogers, 2012, p.3; Levi-Strauss, 1966).

Outsiders: Legitimate participation by peripherals?

In the preceding discussion, I allude to three other threads within the data that have not yet been 'worked': 'home'; 'outsiders'; and 'mobility'. In this section, I aim to bring these back into view. While 'home', 'outsiders' and mobile practices have been mentioned and described briefly already, I revisit them here to illustrate how the 'emerging-blended-learner' comes "together for a certain time to create an identity" (Mulcahy, 2017, p.112).

Home influences result in different performances of blended learning. For example, Teresa's remarks above about not having a desk at home 'propels' her away from home to the library to study. For Andrea, not having a desk creates different outcomes: 'I've got my own room, I don't have a desk so I study on my bed – which is not good, it's bad for my back, it kills …'. Jane has a bed and a desk, so she alternates: 'sometimes when it was late night study I'd sort of swap between the desk and lying in bed, reading'. Sharing a desk and a room with another student creates difficulties of other kinds for Jill:

Tony So do you have your own room?

61. See Jane in Chapter 4.
62. See Larry, Chapter 5.

Jill No. I have a big desk and share with my classmate. I have a big place to put books and we have the computer.

Tony Is that a shared desk, or is that a table?

Jill It's a very big table, very long … in the middle, and our beds.

Tony Tell me a bit more about when you are studying?

Jill I think my room is very noisy because my room is near the kitchen. My classmate cooks in the kitchen so the noise is very big (sic). I have no time to cook, so I focus on my study.

Encounters with noise mingle with study, influencing both when and where this can take place. Jill finds herself in a 'living-learning place', needing to negotiate and cooperate for space and time with a 'big-desk-mate'. Barry too has housemates that create a need for negotiation of time and space:

Tony Just in terms of your own learning space, though … at home… do you have sort [of] facilities?

Barry Mm. Okay. Two spots, so my own room, desk, wireless internet, and all my books by my side, and then when … I live with two housemates, so when they go, into the kitchen, bigger sort of living space. Computer set up in front of me, all the books in front of me, and it's pretty much just a big sort of bench. And I'd be there for hours.

Tony Any background noise? Television on, or any of those?

Barry The lounge room, we do live … I guess you could call it a main road, but because the lounge room is towards the back of the house, it wasn't getting any noise besides the dog barking and very distant noise of trucks. In my room, a lot noisier, that's why the only time I would study in my room was at night.

Tony So you'd generally study in a common area though?

Barry Common area, yep. But with … when the girls were out of the house. The second I told them that I was studying, well, I was going back to study, they said what their hours were, so I was like, cool, I've got Monday, Tuesday and

Friday, to study in the lounge room, you guys aren't home, that's my spot.

His situation might be characterised in a similar way to the nomadic blended-learners on campus, moving around and caught up in a variety of material objects as they go, including their technologies. Likewise, for those participants who find themselves mobile and attempting study in transit (see Chapter 5). In these three 'sets' of practices, rather than a tug-o-where (Enriquez, 2011), between what seem to be separate learning spaces (such as the physical and digital), there are complex connectivities that challenge binary thinking and materialise blending learning in distinct, open-ended, and highly variable ways (Mulcahy & Morrison, 2017).

For the blending learner, the distraction of noise creates opportunities for learning in different places. For example, like Teresa, Andrew finds it necessary to leave home and go to the library, but for different reasons: 'Well, it's ... people never notice, like they're playing music loud, so ... it depends, if there's a bit of noise then I just shut my door, even like ... if it didn't work, then I prefer pretty much to like, come into the library'. Merryn finds different sorts of distractions and responds in her own way:

> Yeah, my brother and sister, they watch TV at times, so ... at times there's noise in the background as well. Sometimes they will have friends over as well. Sometimes it's distracting, because you can't concentrate on what you're writing or doing at the moment. Most probably I do my work in the afternoon or early in the morning. Yeah, because I like to stay up late and do my study.

In other cases, siblings assist the participants. For example, Mary normally went about her studies at home alone, however she explains that 'if there's a hard situation, I will have to ask my sister either on the phone or wait until my sister arrives'. To make home a place of blended learning, the participants need to be able to move rooms, modulate or ignore noise, wait for siblings to be of help, endure pain or perhaps share a personal space (bedroom). 'Distr-actors' enter the blend in many forms like those above (cooking, a barking dog, trucks, television, brothers and sisters, house-mates' rosters). For Kevin, they include being helpful:

Tony Background noise?

Kevin Fairly quiet. I would usually get my brother or sister coming in asking the odd question.

Tony Where do you fit in there, younger or older?

Kevin Older.

Tony So they're looking to you for assistance?

Kevin Yeah, basically. There were some cases where I'd have to take my sister to piano lessons.

In Kevin's case, he agreed he might be considered a 'mobile user' of educational technology. When he goes out to drop off his sister, he takes his smart 'phone with him and does some studying. Peter's sister is also studying accounting and helps him:

Tony Tell me about your room, thinking about how you went about your studies.

Peter When I have an assignment, I go home, I go … When I'm alone, I call my sister.

Tony Oh, you call your sister?

Peter She studies at university, accounting. I call her, I come to her, she's helping me.

As can be seen in the discussion above, when blending learning at home, the bodily positions of the participants are acting and being acted upon by materials and people (Enriquez, 2009). There are many other 'mobilities' on display in this and the previous two chapters. Blending learning becomes a continuation of practices outside the classroom, for example in the car at the lights (Melissa reads notes), or when dropping a sibling off at piano lessons (Kevin and his smart 'phone), or using Turnitin on a train (Aaron). Rather than being a special new way for blended learning to be enacted, mobility simply 'goes along' with the practices of the participants. The mobility, the technology being used and the affordances that these might offer are an effect of the practices within which they are embedded or through which they are brought into effect.

There are several identities forming here, for example the 'emerging accountant[63] – a pathway to a job after completing a bachelor's degree in business. As explored in Chapter 4, there is also for these nascent business people, the work of 'emerging-competent-student'. Starting in their first year of studies, these learners are shaped by the sense-making activities in which they take part, the faculty, their friends and others – especially trusted 'outsiders'.

I have alluded to the role of trusted outsiders in several places within this and each of the two preceding Chapters. As diverse as the participants themselves in many ways, some trusted

63. The majority of participants in the study were taking the Accounting major. There were also 'emerging-marketers' and 'emerging-administrators'.

outsiders are relatives, some peers, some workmates, and some simply identified as having potential as a mentor. They shape the practices of individual participants in many ways. Vincent (a South American student) relies on his supervisor at work and others to guide him:

> Shane, I give my work to him. He's my supervisor in Moku Cafe. In order to practice my speaking I'm working as a sommelier apprentice in Moku Cafe. In Moku Cafe, they have a guy that goes to teach the international students how to communicate to the corporates. For example, Latin people are too aggressive or speak too much with their hands. He goes there to put people on the same level like Aussie. This guy talks a lot about Business Communications, he talks a lot with Shane and I gave my literature review to Shane [for feedback].

Vincent also uses Skype to interact with his mother to improve his language skills. They stay in touch online: 'She actually participates on my Facebook about correcting my grammar in Spanish because she thinks it's really important that I show the typical grammar of the people my age'. Peter and Mary get help from their sisters who are studying accounting. Jane looks to Michael, another 'outsider' for help, discussing the latest topic with him:

> Oh, okay, well Michael owns a business, a team, a small team … But um, through this course and the years I've been trying to look for mentors, and with his business he's got 35 years … I thought hey, why not …

For Yvette, her friends Mina and Yen are helpful: 'they study at Deakin.[64] They moved from Hawthorn to Deakin. Yeah, she also … when I don't understand something … she'd help me a lot'. These learning practices are interwoven with the 'everyday' learning of being a student doing Business Communications at VTC. Some mentors are close at hand, others work through technology-mediated encounters. Each shape their protégé in a different way towards emerging-accountant; emerging-marketer; or emerging-administrator. Their co-produced learning activities are activated by a range of other material actors. For Vincent, there is: a mentor (mum); Facebook; an internet connection; English grammar; and Spanish, that bring a form of blending learning into being.

Breakdowns: Blended learning for whom?

The preceding discussion in this Chapter and in Chapters 4 and 5 provides insights into how blended learning practices derive from associations or entanglements with bodies, lectures, texts, technologies, travel, buildings and rooms. The data show that while many articulations

64. The reference here is to two different local universities, Swinburne (being 'Hawthorn') and Deakin Universities, each a 20-30 minute drive by car from the VTC campus.

demonstrate what might be called 'good practice' in blended learning, there is a politics attaching to the emergence of these nascent networks and consequences for some students involved in them/excluded from them. The following examples again reveal the co-produced nature of the blended learning environment and yet, how practices that work for some, do not translate into success for all.

THE NON-COMPATRIOT AND NETWORK FAILURE: A PAST BROUGHT FORWARD?

If the social can make blended learning networks hold together (Chapter 4), it can also prevent them from forming. While the data suggested learning relationships emerging from a common nationality, participants from different countries can make for difficulties in building learning relationships. This became apparent where Vincent had a prior experience with individuals from a particular group:

Tony (asking about the class sketch) Another observation … is that you may have been feeling a bit isolated perhaps? Even though you were sitting in the middle of everything, was there any sense of isolation?

Vincent There is a reason; I did it on purpose at the beginning of the degree. It was because of a personal situation, which … someone copied my work. Three times – during the whole degree, on the diploma.

Tony On the diploma?

Vincent Yeah, so in the last bit of the diploma and part of the degree. I really felt frustrated and wasn't working with people … I really like mixing with people in general. It was an immature reaction from me, because the people from that thing, that copied, they were from [another continent], so …Yeah, it was like a … I feel a bit frustrated … And so I sit separate from the group.

In the preceding section, Vincent explains how much he relies on his 'outsider' networks to help him with various aspects of the learning tasks, including developing his language and academic skills. In contrast, it is evident from his sociogram in Figure 48 below that he did not cultivate learning relationships ('connect') online through the LMS discussion forum or with his peers on campus. Vincent's only correspondents on the LMS discussion forum were from his own tutorial. He did not have any peers from the course that he nominated as friends or 'helpful others'; the only helpful others he nominated were the four outsiders listed separately. Vincent eventually fails the subject and needs to repeat it to progress towards his goal of becoming an accountant.

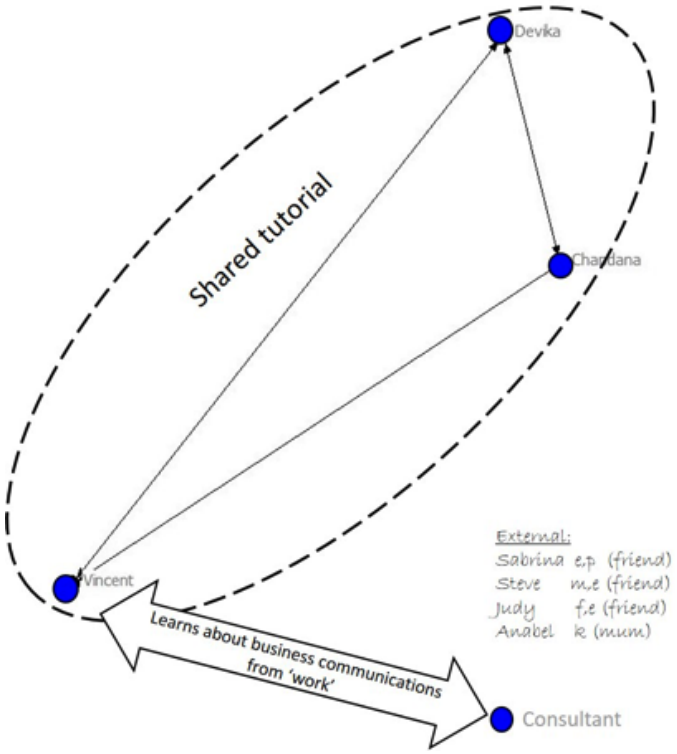


Figure 48: Vincent's developing blended learning network

A BREAK IN THE LEARNING 'CONTINUATION'?

Not knowing other students from the subject (or tutorial) might lead to difficulties in digital spaces, as Victoria, a correspondent of Deanne, Merryn and Mary on the forum, explains:

Victoria Well … the funny thing is that I didn't get involved that much. I'd write the things that I was supposed to write, but not a lot replied to me because they didn't really know me, and I saw that people reply to people that they know.

Tony So is that the feeling you got? Was there almost a sort of social response?

Victoria A little bit, yeah. Another one I posed a question but nobody replied to me though. I did know that was going to happen.

Not 'knowing' Victoria personally suggests that the digital dimension of blended learning is reinforced through the (physical) 'knowing bodies' of others. The contested nature of the community of practice is in evidence here (Lea, 2005), despite the well-intentioned class members like Melissa: 'I felt bad for them, some of them had no responses so … so I would sort of respond to them, give them a bit of feedback'. In a course numbering 80 students, these gestures cannot practically extend to all. The literature on selection of correspondents in discussions in blended learning environments supports Victoria's view that friends were

corresponding with each other (Stevens, 2013). From her description of class activities, Victoria also suggests some level of exclusion in the tutorial, referring to her classmates:

> No, well the main point is like … these groups are more of friends thing, they talk more between them, so they all get to know each other really well. You know, if you don't know each other, you don't have that trust.

Celine, as Victoria's nominated 'helpful other' (on her sociogram), was actually from her tutorial class: 'We were always talking before the class, after the class and before the lecture…. she always explained things to me'. On the LMS, Victoria reads 22 messages, sends one and receives seven, adding 197 words to discussions during the semester. Victoria completes the course with the barest of passing grades. In the cases of both Vincent and Victoria, it appears that success in a blended learning network relies on embodied knowledge of peers. This becomes more apparent when we consider these two participants and contrast them with the expansive and 'busy' sociograms, reflecting the blended learning practices of Jane and Ricky in Chapter 4 (see Figures 15 and 16).

AVOIDING 'UNFAVOURABLE' ENVIRONMENTS OR BECOMING 'UN-CONFIGURED'

For the blending learner, interactions with technology, learning materials or the many other actors along the way can provide distractions from getting things done. Both Melissa and Jane experience potential setbacks in both the physical and the digital environments. For example, Melissa finds the library is a place of 'distraction' with her on-campus blended learning:

> I think it was because everyone was just starting stressing out. They all started going to the library and … I mean I can't work with people, I like staying by myself and just staying focused and everything like that. They'd always try to organise a study group and I don't want to do that because I know I would get distracted.

For Jane, Facebook proves to be a distraction:

> And I didn't really Facebook anyone. Um, well, I've chosen not to follow anyone I met at school on Facebook, I've just got my outside friends, and … Yeah, I mean I was on Facebook at times, but yeah.

Teresa finds Facebook 'distracting', and Kevin remarks that he considered it a 'time-waster'. Noise, cooking, siblings and other actors are participants in blending learning, but not always it seems welcome ones, as Teresa explains:

> At that time the house was empty. Because nobody is making noise or coming up with obstructions. Then I could move out of my room and go into the sitting room or the dining room. I can only study at home on my own, which is quite okay because my housemates work.

Blending learning involves negotiating a range of physical and digital environments. In their on-campus classes, participants need to engage with their peers and the learning environment, however varied and challenging – or perhaps "gross and subtle" as (Connolly, 2002) has it. Technology, personal life and learning all 'bump' into and overlap with one another in an ongoing and open-ended set of practices. There is always the potential for distraction. It seems that at times there is a struggle to keep learning 'containerised', driving a need to switch off or be 'away'. This is a problem that these blended learners grapple with, where interruption and distraction are an always-present issue. The data here suggests that these actors form more than a latent aspect of the learning environment – they too are a part of the learning assemblage in the two preceding Chapters.

CONCLUDING REMARKS

In making the suggestion that blended learning is more than about where students meet and how they use their technology, McGee (2014) urges researchers to look 'up stream' at learning design in blended learning environments. In the previous three Chapters, I have chosen to look 'down' into the everyday, searching for insights on blended learning as a sociomaterial practice. Rather than a nexus of online and embodied activity, or a dualism of human/tool, I have presented an account of knowing practices with a "focus on materials as dynamic, and enmeshed with human activity in everyday practices" (Fenwick, 2015, p.91). This sets the scene for a discussion of the emerging themes in the data in the Chapter that follows.

Chapter 7

Re-assembling Blended Learning

"It's practice all the way down" (Bruno Latour, 2005, p.135)

In this Chapter, I bring together themes that have helped me reframe blended learning as a sociomaterial practice in which technology and people are co-constituted. Thus, instead of looking at blended learning as the product of the *digital* and the *embodied* encounter,[65] this thesis looks at digital and embodied encounters as the products of the many and varied processes of blending. What this reframing affords is an extension of what 'counts' as blended learning – my first research question. It also allows me to extend current understandings of the role and contribution of technology to the practices of blended learning at VTC – my second research question. This sets the study apart from other forms of blended learning research, for example, 'design research' that examines models of blended learning to "show how to manipulate an intervention to achieve a desired result" (Graham et al., 2014, p.25). While there is data in this study that demonstrates such 'manipulations' or 'interventions' exist in the course design, looking down into practices as I have done here suggests there are important, subtle and emergent complexities involved in blending learning that need accounting for – the "missing masses" (Latour, 1992).

In the next section, I introduce a visual array of the practices explored in the preceding three chapters, an integrative but not exhaustive illustration of the learning assemblage. The themes that follow engage with each of the research questions. Thus, in the second section, I examine some hybrid engagements that illustrate what 'counts' as blended learning. I argue that beyond formal design for blending,[66] sociomaterial practices in both physical and digital teaching and learning practices exhibit a hybrid character, that in close-up, extend what we might characterise (or 'count') as blended learning. The third section provides examples of the contribution of technology to blended learning at VTC by considering the 'places' of blended learning as a sociomaterial bricolage. Participants engage with knowledge practices as they emerge – social and material together. These practices comprise a network of on-line and campus-based face-to-face practices. The fourth section addresses the question

65. The term 'encounter' pre-supposes interaction between two or more stand-alone or discrete entities. It does not pre-suppose what Barad (2003, 2007) calls 'intra-activity' (entanglement) between them.
66. Illustrated through the exercises and assessment tasks set by teaching staff described in the Unit Outline and in the configuration of the LMS – see Chapter 4.

of mobility and movement, a strong underlying theme in all three data chapters that provides a view of the role of technology in blended learning as 'affordance performed'.[67] A performative view of affordance reveals that it is not a property of the technology, but rather something that emerges with and is an effect of practices. In the final section, I explore identity. Identity features strongly in the CoP literature, however I offer an alternative view of the individual 'blended learner' that is accounted for by considering individuals as hybrids of co-agents (Michael, 2000) co-constituted and made visible by foregrounding the sociomaterial practices of blended learning. This provides an introduction for further discussion about how blended learning is practiced in the context of vocational education degree studies at VTC[68] in the final Chapter.

Introducing the Practogram

My exploration begins with a diagram that I have called a 'practo-gram' (see Figure 49 below). The practogram allows me to link some of the data that has been 'storied' in the text so far. My first research question – what 'counts' as blended learning – shows in the diagram as a collection of varied practices mingled with mundane, contemporary, large-scale and small-scale technologies. It also represents infrastructure, software, movement and a host of other actors that 'perform' blending learning. Importantly, it also represents a series of agential 'cuts' (Barad, 2003) I chose to make as a researcher in my practice, that are exposed in my attempt to find out what 'counts' as blended learning. My response to the first research question is that blended learning is made up of the "myriad translations that are negotiated among all the movements, talk, materials, emotions and discourses" (Fenwick & Edwards, 2010a, p.8) in the everyday encounters detailed in the preceding Chapters.

In previous Chapters, I modified and adapted sociograms to display sociomaterial practices. These mostly featured human 'nodes' showing various social interactions and relationships. The algorithms behind the sociogram shape the display in human-centric ways. In the practogram, material objects and the sociomaterial practices that perform blended learning are foregrounded. It is a way of displaying my data as a "set of (pretty disorderly) stories that intersect and interfere with each other" (Law, 2000, p.2). Items on the practogram do not represent 'nodes' in a literal sense, rather, a loose array of material practices that display a heterogeneous and provisional assemblage of blending learning.

I have chosen to lead my discussion chapter this way to help me illustrate the messiness of blended learning practices, something that I referred to in Chapter 6 as 'learning in the

67. Affordance was examined in the literature review and is a "prevalent and persistent term in the literature on mobile learning" (Wright & Parchoma, 2011, p.249).
68. My third research question.

making'. I have used it as a device to engage with the hybridity and the heterogeneity that I encountered in my study of blended learning. The role of technologies as actors that contribute to the array of practices is shown in response to my second research question: the role and contribution of technology in blended learning. Blended learning practices hold together in different, every day and mundane technologies in every sense of the word (not just ICTs) as I go on to discuss below. Infrastructure (like the library, Cafeteria and classrooms) appears in the diagram, but its contribution to bringing blended learning into effect is highlighted by taking a sociomaterial approach. The discussion forum also appears – a sociomaterial assemblage that performs blending learning in the study. These are examples of sites where imbricated practices – digital and physical[69] – allow blending learning to 'clot' into small-scale, hybrid, provisional, actor-networks.

The practogram lays out particular, localised practices described and shown in the study. It does not position blended learning as "an instance of, nor situated within, a larger social system" (Fenwick & Landri, 2012, p.5). Neither does it portray interconnected technologies at work ('a network'). The practogram's character is potentially that of an "action net" illustrated (Czarniawska, 2004).[70] Though the diagram consists of dozens of the elements described in the study, it is not all-encompassing, illustrating that "the world is so rich that our theories about it will always fail to catch more than a part of it" (Law, 2004, p.8). For example, looking to the edges of the diagram, it is easy to see that other actors (parents living overseas, a body of business communication knowledge, other subjects making up the degree, or an employer) who have appeared in this study might emerge and take a bigger role in explaining how and why smaller learning networks emerged and succeeded (or failed).

The human participants who appear to be missing in the diagram are situated in the practices distributed in the array, physically and temporally, along with their devices, other hardware and the software that sometimes performs blended learning *with them*. What appear to be separate and fixed locations – the campus, the learning management 'system' and other places like 'home', emerge as being interdependent as their intra-action (Barad, 2007) is lifted to view and the material practices constituting them are credited (Mulcahy & Morrison, 2017).

69. By physical I mean human and non-human entities.

70. An action net can be conceived as the way in which "certain actions are connected to one another.... action nets usually transcend(ed) any given organization" and further: "Studying action nets means answering a dual question: what is being done, and how does this connect to other things that are being done in the same context?" (Czarniawska, 2004, pp.782; 784).

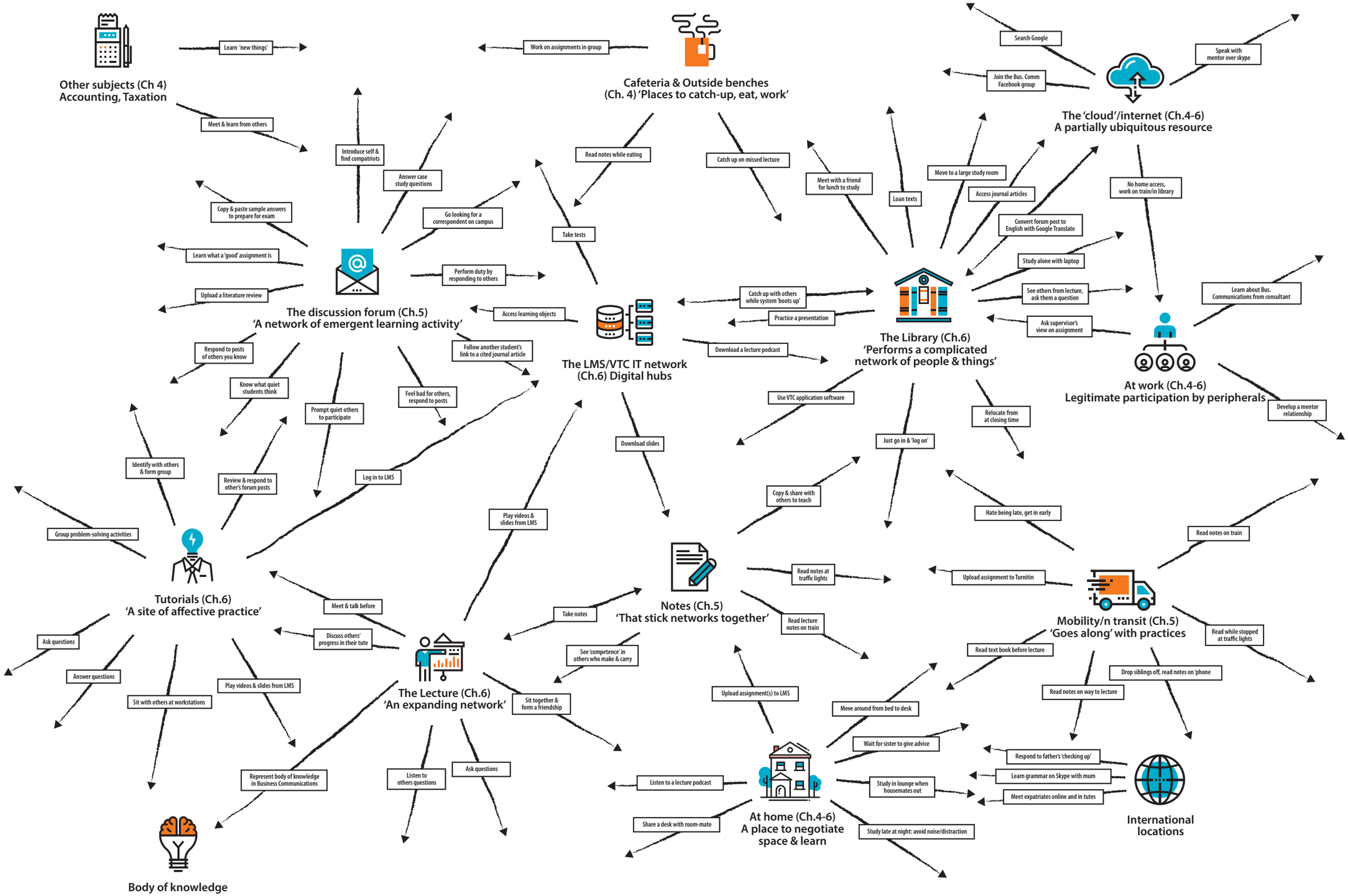


Figure 49 Blended Learning Practogram: A complex performance of human and non-human entities

Hybrid engagements: Embodied and digital 'doing' – the forum and beyond

Received views on discussion forums in general position them as a digital 'space' or a learning affordance (Rovai, 2007). These perspectives take a functionalist view of such a learning application. Substantial effort in analysing forum content as discourse is also evident in the literature on both blended and online learning (Dennen, 2008). Taking a functionalist stance, Knowlton's (2005) taxonomy provides a good example of how interaction in a discussion forum might be analysed. The scales of Knowlton's (2005) taxonomy used to classify asynchronous discussions range from passive to metacognitive (see Chapter 2, p.19). Ranking interactions this way suggests certain elements in the discussions are important enough to appear on a scale and be valued. What might be called front-end decisions are made about what online discussions 'count' as valued learning and what don't count.

The initial presentation of forum data in this thesis 'bought in' to functionalist lines by 'counting' messages, threads and so on (see Tables 4 and 5, p.67 and p.97 respectively). Making a conscious decision to treat each of the four discussions as separate entities and break down the number of 'reads', messages and replies ('threads') leads to foregone conclusions about the usefulness or affordance for learning provided by this technology.[71] Accordingly, I set out in a different analytic direction. In the following, the teacher, students and technology come together as a network of embodied and digital 'doing', producing blended learning as an effect.

Thinking relationally, the discussion forum in the LMS performs blended learning in a different way. The forum was more than a digital space, resource or text. The way in which the forum developed as a learning and social space took it beyond the discursive or functional views of a learning discussion. Forum practices revealed some of the tensions between the (human) embodied on-campus practices and the digital encounters that took place both on and off campus. As a space for representational knowledge display and storage, the subject outline laid out standards as 'desired results'. This functionalist view (though meeting an operational 'need' to assess students) veils the emerging practices that were apparent in the translations taking place in forum practices. Missing from functionalist accounts are the "collateral realities" (Law, 2012, p.156) that unfold in the assemblage.

In the 'forum data' collected, collateral reality practices include giving voice to others who are silent in the tutorial class. The quieter students' posts in the forum gave Celine an 'idea of what they [her peers] think'. She uses the text in the online space to bridge the gap in class contributions from her peers. In reverse – in the same class – Barry observes the 'quieter

71. Or perhaps about a learner's style or contribution to the class or forum in terms of effectiveness.

ones' and uses the forum to 'give them a little nudge' so that when they saw a compliment here or there they 'might want to actually start contributing more'. Postings by Barry and Jane (Chapter 5, pp.101-102) that encourage others through collaboration take Knowlton's (2005, p.157) "dialogical" form in that they "emphasise community among participants". On the other hand, Celine's description of the 'quieter students' postings may indicate "passive" participation in Knowlton's (2005) formulation, yet their differing types of participation were significant in the context of the type of blending that emerged from Grace's tutorial.

In Chapter 6, Celine remarks: 'Grace was asking opinions on everything', and as Barry illustrated in his class diagram, there was a significant amount of tutor-led dialogue in that tutorial (Figure 46, p.108). As a form of blending, Grace's tutorial takes on a more discursive than digital character, supported by the data in Chapter 6 showing significantly lower levels of LMS login during class than the other three groups (Figure 47, p.109). Yet at the same time, digital 'doing' informs activity in the class for participants like Celine, Barry and others – the forum still played a role in digital and embodied meaning making, both on and off campus for Victoria and Bill. Victoria is never actually able to bridge the social gap in the online space – not being 'known' in the physical space led to her posts going unanswered. Bill accesses the discussions as a resource to help him study, but is not a significant contributor until later when Jane, from another tutorial, expresses appreciation for a sample question he poses that might appear in the exam. This accords with findings by Chen and Chang (2013, p.171) who suggest that "lurkers … may only sporadically contribute to the conversation, but quite often make significant contributions when they do". These are the less predictable practices that drop from view in conventional accounts of blended learning. These practices also intersect and interfere with each other, emphasising the situated and contingent character of blending learning. The tutorial and the forum are woven closely to perform a blended learning assemblage.

In Roger's tutorial group, another forum-tutorial hybrid takes shape. The sketches made by participants of classroom interactions and some of their descriptions of the activity in the tutorial are lively, embodied accounts. These tutorials were also steeped in digital activity related to the discussion forum. For example, Deanne, who is one of the more prolific writers on the forum, contributes most of her postings while in class. She chose to sit off to the side in class because otherwise she 'would always talk to people'. Though Neil is physically in the tutorial with the other Go5 members, he indicates that the group formed around the forum:

> The thing that broke the ice, how we became friends, is through Moodle when we started chatting, interacting on the forum; we'd say hey, you had that idea on Moodle, and I think it meant … this and that. Then we might argue about it. That's how we got close to each other, through Moodle.

For this group, teaching practices also bring a much more purposeful dimension to blending the forum and the tutorial. Ricky described how in class: 'we pretty much got to revisiting the forums, looking at them, giving opinions on what other people have written'. Melissa talks about 'going up on the computer and doing it' in reference to class exercises. The contrast between the two tutorials in terms of how the 'blend' emerges is significant. In Grace's class, the forum has more of a latent presence, yet this is still felt by Celine who learns what her peers think, and Barry, who feels compelled to encourage 'quiet' students. For Victoria, the forum represents an unrealised learning network, yet she still reads messages and posts there herself. The LMS itself is not accessed much in Grace's tute. In Roger's class, the LMS data makes it clear that it is a more manifest part of the teaching practices. This is matched in the classroom by the embodied meaning-making that is taking place. There is a busy-ness in the blend in Roger's tutorial involving human and non-human bodies that coalesce to constitute blending learning.

Using the tutorial-forum hybrid as an exemplary case, it is clear that blending learning takes place over time, in digital spaces and through embodied meaning-making in and outside of class, on and off campus. Rather than a nexus of interactions, or humans acting on or shaping technology (or vice versa), blended learning is a continuation[72] of 'intra-active' (Barad, 2007) learning practices: practices that are onto-epistemologically entangled or sociomaterially produced.

This gives rise to the possibility of a 'blend multiple' (Mol, 2002). When considering multiplicity, Fuller and Unwin's (2004) concept of expansive and restrictive learning environments is helpful (at least initially).[73] Restrictive learning environments are said to take a top-down view of expertise with limited opportunities for reflection and a narrow focus on knowledge or skill acquisition as it applies to the task at hand. Alternatively, expansive learning environments are said to involve boundary crossing, take a multi-dimensional view of expertise and involve more widely-distributed skills amongst the participants involved. Some forms of blend in the study allowed for the development of expansive learning environments, more than one 'type' of blend, perhaps many, while others might be said to be more restrictive.

Blends that focussed on the teacher-as-expert might be said to take on a more restrictive form. For example, a blend that unfolds from a multi-modal lecture, to a podcast played later, or perhaps a tutorial that is more tutor-dialogue driven (see Grace, Chapter 6). Peter uses his notes, Microsoft Word, and Google Translate when he seeks to post an answer or

72. Latour (2010) might call this a compositional process, rather than a continuation of entangled practices.
73. Though these categories suggest a dualism at odds with the heterogeneity of the practices described in this study, they have a helpful function in this section to identify what I term 'characterising features'. This allows for the possibility of mash-ups that are inclusive of both types of environment sequentially or concurrently, while other instances might coalesce towards one characterising feature or another.

respond to another student on the discussion forum, engaging in a task-focussed or perhaps more restrictive blend. Other blends that emerged might be more expansive, for example in the large group that developed as described by Aaron in Chapter 5 where expertise and knowledge was built not only for Business Communication but other subjects. Likewise for Deanne's notes-led study group involving her own peer-level coaching with her compatriot and the group that gathered in the library before exams. In each case, the pooled knowledge of the individuals drew on external resources. Deanne and her peer's situation involved an 'old' technology: paper and photocopier, and the latter, the library and network resources at hand. In these renderings, multiple forms of 'blend' involve something other than: (1) the percentage of technology or time spent in class (Glazer, 2012), or (2) the learning design (McGee, 2014), or (3) whether blended learning is transformative (Garrison & Kanuka, 2004), or (4) a "thoughtful fusion of face-to-face and online learning experiences" (Garrison & Vaughan, 2008).

I propose that blends are practice led; they emerge as contingent and unfolding and as co-constituted sociomaterially. A lecture and its podcast suggests a blend, but one that might be restrictive in practice, given its 'didactic' (Rosell-Aguilar, 2015, p.42) nature. Larry's blended learning practice involves listening to the lecturer's podcast: 'sometimes [I] put it on my iPod and just listen. I'm not really focused on doing anything, just listening. I think that's working for me'. Bill's use of his peers' forum data to develop specific answers to possible exam questions (see Chapter 5) is suggestive of a restrictive blend. Bill also limits his personal contact with others in his tutorial group: 'Most of the time when it comes down to studying by myself it's always in the library'.

The library is a place that also participates in what might be characterised as an expansive environment. Aaron and his peers form a group with expertise in multiple subjects, territorialising spaces in the library like the large study room: 'everybody went into the room. Like, eight people. All sat together. Not only talking about business communication; some accounting, when we sat together it was better. We could ask … any doubts we had'. Another expansive blend involves engagement of external advisers and collaboration in learning tasks as evidenced in Jane's blended learning practices. She engages with her mentor (Michael) to discuss assignments; she examines her peer Ricky's work to see what a 'good quality' assignment is and offers substantial contributions and feedback to her peers on the discussion forum.

Place Performed: The Library

While scholars such as (McGee, 2014) suggest we look 'up stream' at blended learning design on the basis that blended learning is more than about where students meet and how they use

their technology, I maintain that looking at 'where and how' technology is used and doing this relationally offers the possibility of extending our understanding of what 'counts' as blended learning. The sites of blended learning (like the library, home and the discussion forum) revealed in this study are more than a 'backcloth' (Edwards & Clarke, 2000) against which tools are employed by knowing users. Blended learners become learners entangled with sites of learning such as the library; this learning and these sites are co-constituting. This differs from Contractor, Monge, & Leonardi's (2011) view of people and material as separate nodes in a network – maintaining the primacy of the social over the material. Their networks are multi-dimensional (see p.23, Chapter 2), not co-constituted, though they acknowledge that "both types of nodes may, on occasion, play equivalent roles" (ibid., p.683).

The library has a role in configuring and re-configuring various sets of actors – human and non-human. It is more than an architectural feature that facilitates combining technology and face-to-face learning activity (this combination being how blended learning is commonly defined or what conventionally counts as this learning). Rather, the library and other sites of learning are *agentive*: they help bring learning into effect and take on different configurations as participants grapple with their learning tasks, peer relationships, opening hours, closing hours, journal databases, books, and many other translation practices (Thompson, 2012b). While tutorials and lectures are regular, once per week events, library practices are more spontaneous and fluid, forming a confluence of blending learning practices.

These practices coalesce and become stable, sometimes briefly, and sometimes as part of a sub-set of practices that expand over space and time. Following how these practices assemble enables us to develop a "more nuanced understanding of the complex, emergent relationships between digital and print, device and user, and author and text" (Gourlay et al., 2015, p.263). Meeting in the library, Deanne's use of her notes provides an example of the role of a mundane and perhaps overlooked 'technology': notes. It was clear from the vignette in Chapter 5 that the material practices following her original lecture note-taking extended to an important blended learning occurrence later that included: meeting on-campus, photocopying, discussing the chapters with Shanta and her compatriot friends, and then later extending her assistance to the group into other subject areas. Practices involving the library are discussed in the following sections that illustrate how the participants and associated technologies enact blended learning at VTC, including: (1) solitary or dyadic interactions, small in scale; and (2) social and mobile encounters that suggest how larger groups of participants form together socially and adapt the spaces around them to their emergent needs.

SOLITARY OR DYADIC ENCOUNTERS

Participants like Celine, Jane, Bill and Teresa tended to access the library for smaller-scale activity like researching for assignments or discussing an assignment one-to-one with a friend. Celine got to the library alone early before class because she 'hates being late'. This created an opportunity to meet with and discuss progress with peers while waiting for the network to boot-up. Even a solitary, early visit to the library is a sociomaterial practice as are 'booting up', talking, checking progress, and logging in. Jane would have lunch with a friend and 'invite them to the private study room' in the library to discuss learning tasks. Bill's practice tended to be solitary – his LMS logs indicate he accessed Moodle mostly during the day out of class time, supported by his statement that 'when it comes down to studying by myself it's always in the library'. Teresa finds herself going to the library because she does not have a desk at home, or when her housemates are at home, 'preventing' her from studying productively. She spends a 'lot of time in the library' and on the computer.

For the four participants above, blending learning *through* the library means small-scale or solitary encounters, accessing the LMS or the VTC network resources for research or for completion of learning tasks, like assignments. For Neil, a cluster of material practices includes (p.111): preparing for presentations; accessing the journal articles on a database; and using 'the library for a calculator'. Andrew chooses the library in which to practice for his slide presentation to get away from home – 'as you might just seem funny presenting yourself in the room' (p.93).

These enactments of blended learning support Gourlay et al.'s (2015, p.270) contention that students place themselves in particular places (in this case the library) not so much due to its 'absolute' qualities, but rather more as a consequence of a "complex calculus of motives, including not just their intentions at that time, but the surrounding context of their unfolding day". Returning to McGee's (2014) suggestion that we also consider design features of blended learning, this might reflect that in the VTC environment, design of pedagogy *and* place/s remains a worthwhile and continuing matter for consideration.

SOCIAL AND MOBILE

Aaron (a benchmate) and Larry (from Chapter 5) each describe larger sub-groups whose practices involved social learning with their peers, and certain forms of embodied meaning-making suggesting that the library was host to (co-constitutive of) more than solitary or dyadic learning. The Benchmates spent 'more of their time in the library studying than at home'. Aaron's claim is that they spent more time out of the tutorial room discussing questions than in it, and that the group did 'all their assignments together'. Later – to study

for exams – the group expands from five to eight members to clear 'any doubts we had'. Larry's practices involved his compatriots, the pooling of knowledge on subjects beyond Business Communication and territorialising the available spaces in the library to help with the group's productivity. It was in the library that Deanne used her notes to help prepare the small study group for final exams (p.92).

For study participants, being mobile and blending learning off campus means managing multiple worlds in social and family situations (Kazmer & Haythornthwaite, 2001). Hybrid worlds emerged from the way individuals' activities overlapped as they allocated their time, attention and resources. Barry creates study territory in the lounge room when his housemates who have varying schedules are absent. When Kevin goes out to drop off his sister at piano lessons, he takes his smart 'phone with him and does some studying. Larry mobilises himself on the train to access the internet (not available at home) and submit an assignment using his smart 'phone.

Mobility and Movement: Affordance Performed

The practice-based perspective that I have adopted in this study positions both movement and learning while mobile as material practices, with each featuring strongly in the data chapters. In the practogram above (Figure 49), 'in transition' warrants its own material practice 'category'. In the mobile learning (m-learning) literature, technology, generally small, portable devices are said to provide an affordance for learning (Pachler, Bachmair, & Cook, 2009; Zaphiris & Ang, 2016) anytime and anywhere (Cochrane & Bateman, 2010). The question of affordance was explored in Chapter 2, where Wright and Parchoma (2011, p.252) suggested that the term is a 'black box' that closes the investigation of 'anytime, anyplace' learning – a functionalist positioning of m-learning as having "an input of access, which occurs anytime or anywhere, and an output of learning". Research in m-learning has tended to "focus on attempts to measure the efficacy of mobile device-based interventions in terms of attainment or achievement gains" (Bannan, et al., 2015, p.939).[74] Distinctions are also made in the mobile learning literature between the physical characteristics of devices and their context of use and the pedagogical design characteristics of m-learning (Kearney et al., 2012). This has commonality with recent reviews of blended learning research pointing out the distinction between 'design research' and two other types of blended learning research, named by Picciano et al., (2014) as: 'explain', and 'explore' research.

The question of technology 'affordance' has been a matter of concern for those examining technology in education (Conole & Dyke, 2004) and the design of technology for users

74. For example, podcasting (Gu, Gu, & Laffey, 2011).

(Norman, 1988) for some time. Oliver (2005) argued that Gibson's (1979) view of the concept of affordance positioned it in a positivistic way, as something that is "objective, real and physical" (Gibson, 1979, p.129).[75] He also challenged subsequent framings of affordance in Norman's (1988) work that positioned it as something that might be *perceived* about the possible uses of a technology, especially in relation to the design of the technology-user interface. Oliver concludes his analysis by declaring that (p.410):

> researchers and designers persist in using the term affordance because of the desire to speak about technology in a general enough way that it can be theorised in its own right. It also promises an appealing control over users – if affordances permit some actions and constrain others, users are more likely to behave as expected.

The present study offers an opportunity to reconsider affordance as neither a property of technology, nor a perception. A look inside the 'black box' of affordance viewed sociomaterially (co-constitutively, not separately) allows me to do this. I was struck by the prevalence and impact of movement in the data from the beginning. Movement and mobility practices feature at the small, local site level, like the tutorials (Ricky moves about in class) and at a more expansive level – Larry's study group moves around and beyond campus to study, taking their devices with them. In an instance of blending and mobile learning, Larry and his group's 'learning caravan' moves between library study rooms and off-campus to the fast-food restaurant showing a dynamic assemblage of: a building and its individual rooms, each taking a turn in the formation of the group's activities; a college computer network and its journals; notes taken by the students from the lecture; digital devices – tablets, smart 'phones and laptops; and the knowledge from the various subjects (taxation or management) that binds the students together, along with their status as compatriots (Chapter 5, pp.95-96). This in itself is a hybrid, mobilised network of blended learning, held together to the extent that it outlasts the availability of the library and the VTC network, moving off campus to continue learning practices in a fast food restaurant across the road. The assemblage is both unfolding *and* moving.

Movement of various kinds had a role in many other practices, for example in tutorials: Merryn 'just like(s) to go around and interact…. even [with] the silent characters'. Or, like Mary, getting to the 'benchtop' to 'catch up' on things missed in lectures with Merryn. Time spent at different work stations with others in the tutorial was especially telling. When the Tutor (Roger) set tasks to complete involving learning resources on the LMS, Ricky responded by moving around to the group members with whom he identified to help him learn. In the same class and sub-group, Neil 'would be walking up and down the class asking everyone's marks'.

75. Gibson's (1979) work explored lower-level perceptual processes and the possibilities (affordances) that the environment might offer to the human or animal based on what they perceive.

Thus, mobility and movement are dispersed among the practices shown above in Figure 49. Affordance is a material practice that is co-produced rather than an inherent characteristic of a technology like a 'smart phone'. As I suggested in Chapter 6, mobility 'goes along' with the practices, a material element in small, simple, local ways and complex, expansive and time-consuming ways. Affordance reframed sociomaterially might have it that mobility, internet access, a 'smart' phone or tablet, notes or a text book and travel time are enactments of affordance. Mary reads her notes or text book on the train on the way to the lecture at the college. Aaron uploads an assignment to Turnitin on the train travelling to the college. Driving into the college allows Melissa to review her notes at traffic lights, and then in the car park on arrival. Affordance is distributed within the assemblage through practices – an effect, not a feature of hardware, nor a perception of the uses of technology as a tool.

Hybrids of Co-agents[76]: Identifying the Blended Learner

Much is made of identity in both the learning and the psychology literature, including individual identity (self-concept), and role-based identity which is suggested to be "a social position a person holds in a larger social structure" (Owens, Robinson, & Smith-Lovin, 2010, p.479). In Chapter 4, I described how study participants (in particular the Go5[77]) were in transition as adult learners from either Diploma or mature-age entry during which time they built identity through negotiation of the group's practices (O'Donnell & Tobbell, 2007). In the foundational communities of practice (CoP) literature (Lave & Wenger, 1991), becoming accepted as a 'member' of a CoP commences with being a participant on the fringe of the community, followed by a process of adopting their practices, developing expertise and being accepted or recognised as a member (Merriam et al., 2003). The blended learning networks that emerged from the study did have *features* that were in common with this conception of a learning community. As Hoadley (2012, p.295) suggests, "the ties between technology and community of practice run deep".

An ANT-informed perspective might also suggest that participants form identities as VTC students by coming into "contact with a multitude of actors in a variety of settings" (Kaufman & Feldman, 2004, p.464). Ricky's encounters in class with his Go5 peers, along with his interaction with other tutorial classmates as shown in his classroom sketch (see Figure 12, p.65 above), as well as a relatively large number of forum correspondents (14), and his two 'outside' helpers (who 'had a background of business, so they are quite knowledgeable') are indicative of the 'actors and settings' with which Ricky develops identity.

76. I am influenced here by Michael (2000) who describes the 'couch potato' as consisting of a television, remote control, sofa and human. A blended learner is a more dynamic construction, but a co-agent nonetheless – see 'heuristics', Chapter 3, for a description of this approach, where I propose the value in tracing hybrids of co-agents resulting in an assemblage (see Chapter 3, p.46).
77. Melissa, Jane, Deanne, Ricky and Neil.

Rather than identity emerging as part of a social order embedded in a learning environment – a 'property', this study suggests identity is an intra-active practice formed through the varying heterogeneous networks (human and non-human) to which the participants became connected (Edwards & Clarke, 2002). Identity practices emerging with blended learning at VTC included: contributing to the online discussion forum (showing one's self as a member of a particular nationality or culture), joining the Facebook interest group (demonstrating membership of a particular aspiring profession), or carrying notes (see comments on p.90 about how this distinguishes competence in others with whom Barry identifies). Extending the enhanced sociograms in Chapter 4, blended learner coagents appear as "markers of heterogeneous ordering" (Michael, 2000, p.44). Explication of coagents reveals significant differences between how the identity of blended learners is formed. When Jane uses her smart 'phone to study while out shopping with her son, she becomes a mobile-family-iPhone-blended learner. When Merryn goes to the Cafeteria and studies with her group, she becomes a social-benchmate-slideware assignment-blended learner.

Blended learner coagents are human-technology articulations (Wise, 2011) made concrete in the practices described in this study. The Benchmates[78] found themselves identifying with their tutorial peers, some of whom were also compatriots. They met over food and engaged in a variety of learning tasks in the Cafeteria and other informal spaces like the outside benches and on Facebook. Identity emerged at specific sites – digital and physical – 'done' through its practices: sociomaterial relations assembled "at a particular place, moment, and occasion" (Law, 2012, p.156). These identity practices are formed through individuals' practices, both in and outside the sub-groups where technology is more than a learning resource – it is entangled in the meaning-making and identity practices of these participants.

At particular places, and on occasions, the blended learning co-agent assembles, comes into being, through a variety of material relations, including embodied meaning-making in class, around campus, online and at home. Other identity practices related initially to success on the course. As Deanne commented: 'they were pretty serious about the subject, so they would always discuss...when assessments were due'. Sharing knowledge with others on an informal basis created affiliations (Deanne): 'look yeah we'd text, Ricky would call, Melissa would always text'. Deanne described how members of the group might prompt each other to respond to their posts in the discussion forum. Positioning each other as 'correspondents' on the discussion forum builds identity by offering peers the ability to display their knowledge in an assessment task for others (perhaps 'outsiders') to see.

78. Mary, Merryn, Andrew and Aaron.

Combining the forum discussion sociogram, modified sociogram (Chapter 4) and practogram, a series of individual blended learning identities is presented in Figures 50-52.[79] These identities illustrate the variability and uniqueness of each of the hybrid co-agents, inclusive of the particular types of technology that individual participants became blended learners with. As I suggested in Chapter 3, neither technology nor human is a singular or stand-alone entity; each is implicated in the other. These individualised action-nets within which co-agents act are distinct from Contractor et al.'s (2011) predisposition for representing human and material elements as separate entities 'acting' upon one another. Likewise, they contrast with the online discussion sociograms of Dawson (2011) and others where the human interactions are foregrounded without the non-human actors that are co-constitutive making an appearance.

In the social constructivist view of learning, technology is considered a social mediator; for example, in Chapter 2 (p.21), the online discussion is shown as a learning tool in a social context. Through the data presented in Chapters 5 and 6, and in the discussion above, I have presented the role of technology in blended learning as beyond that of a mediator, or indeed more than a cultural artefact that provides a "means to act upon the world" (Salomon & Perkins, 1998, p.11). A sociomaterial approach has afforded me the possibility of characterising blended learning *intra*-actively (Barad, 2007) rather than as a human-technology infusion or *inter*action. This also contrasts with other constructivist notions of technology and user, for example, the idea of the learner as being in "*intellectual partnership* with" technology (Forster & Taylor, 2000, p.38, original emphasis).

79. Hybrid co-agent practograms are presented for three identities in the study, each of whom has been part of the discussion in Chapters 4-6. Some additional interview data was accessed to assemble these identities, 'rounding out' the information presented in the data chapters. The concept of an individual's identity as a developmental or cognitive 'quality' is not being shown, rather, these are individualised and person-oriented versions of the practogram.

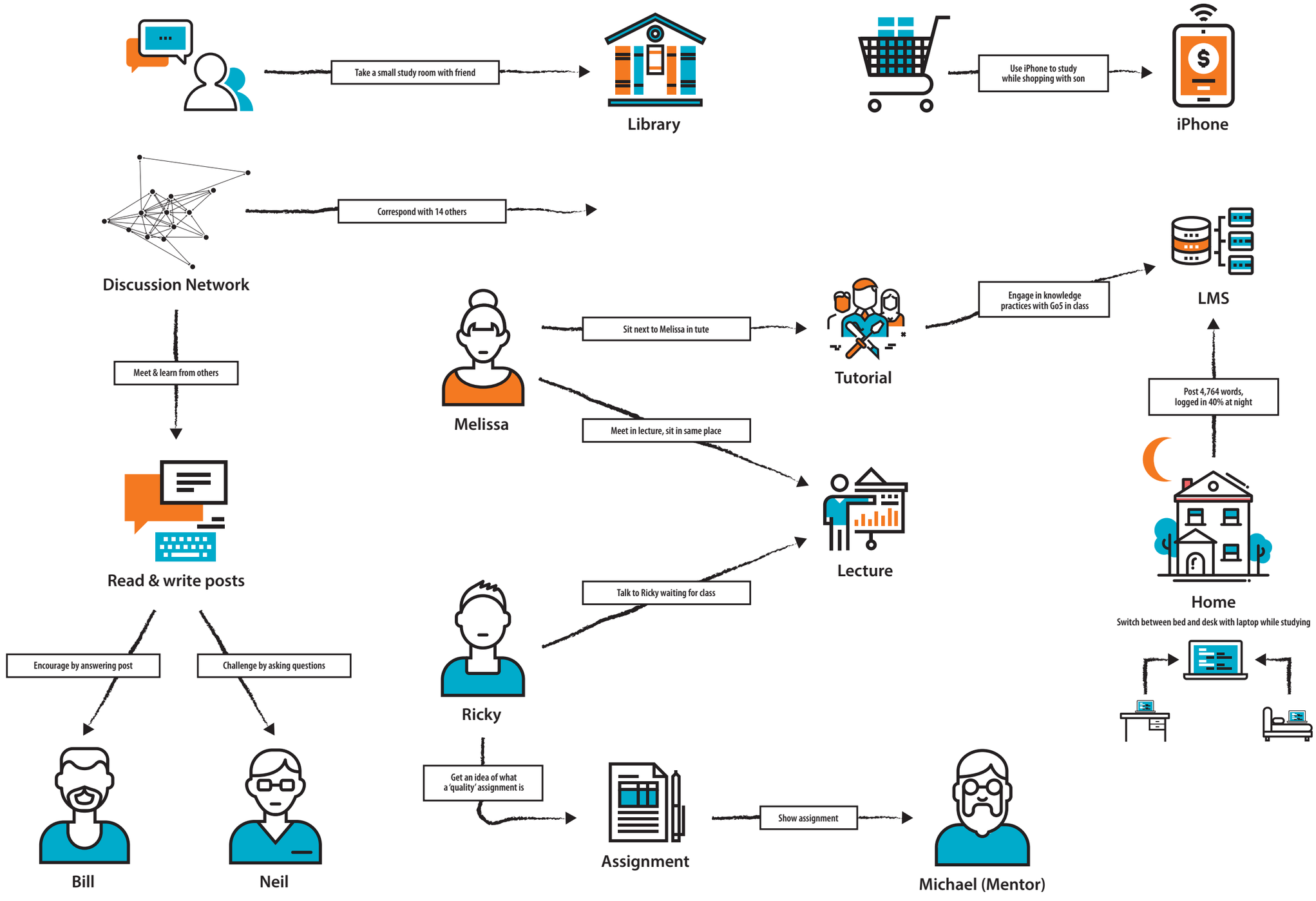


Figure 50: Blended Learner Jane

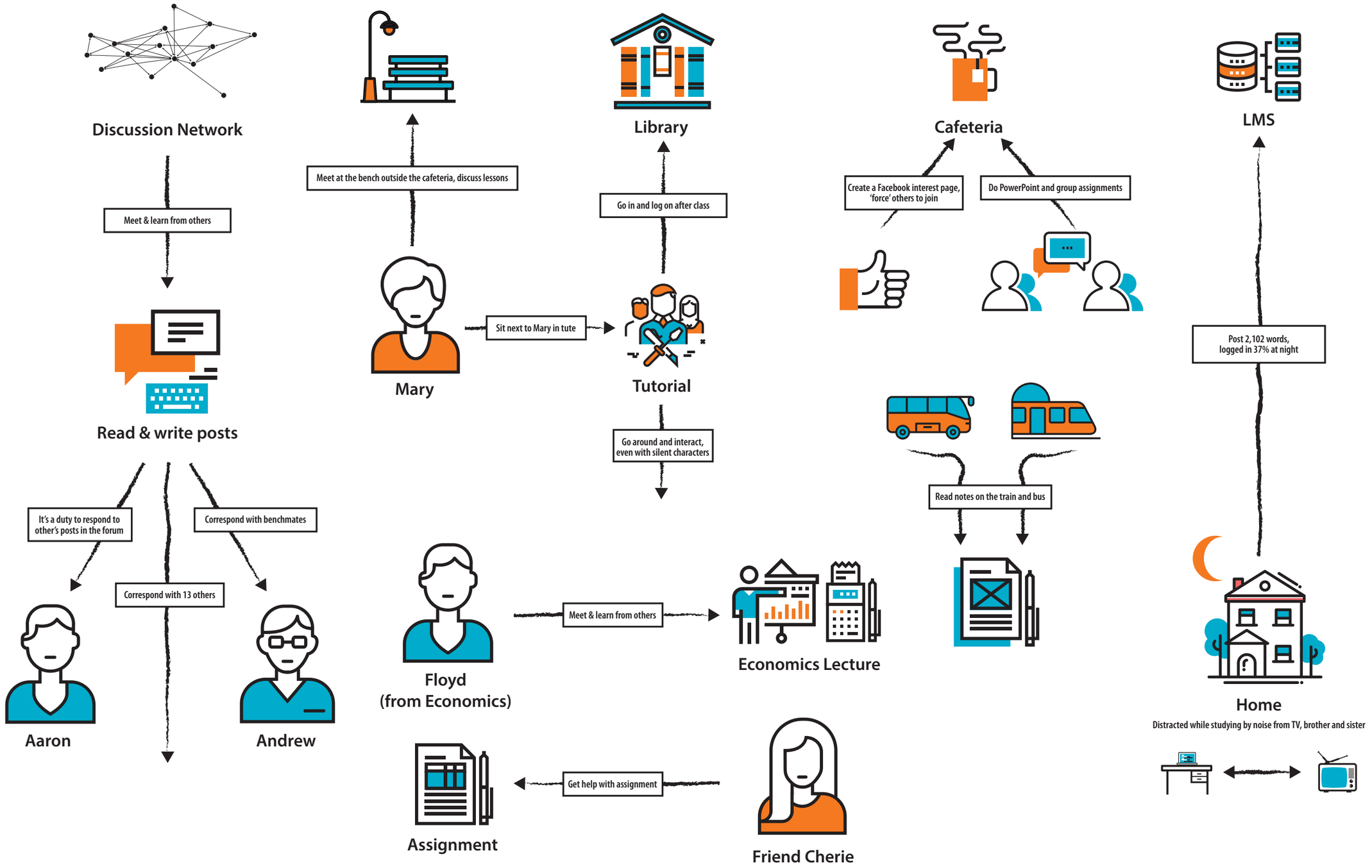


Figure 51: Blended Learner Merryn

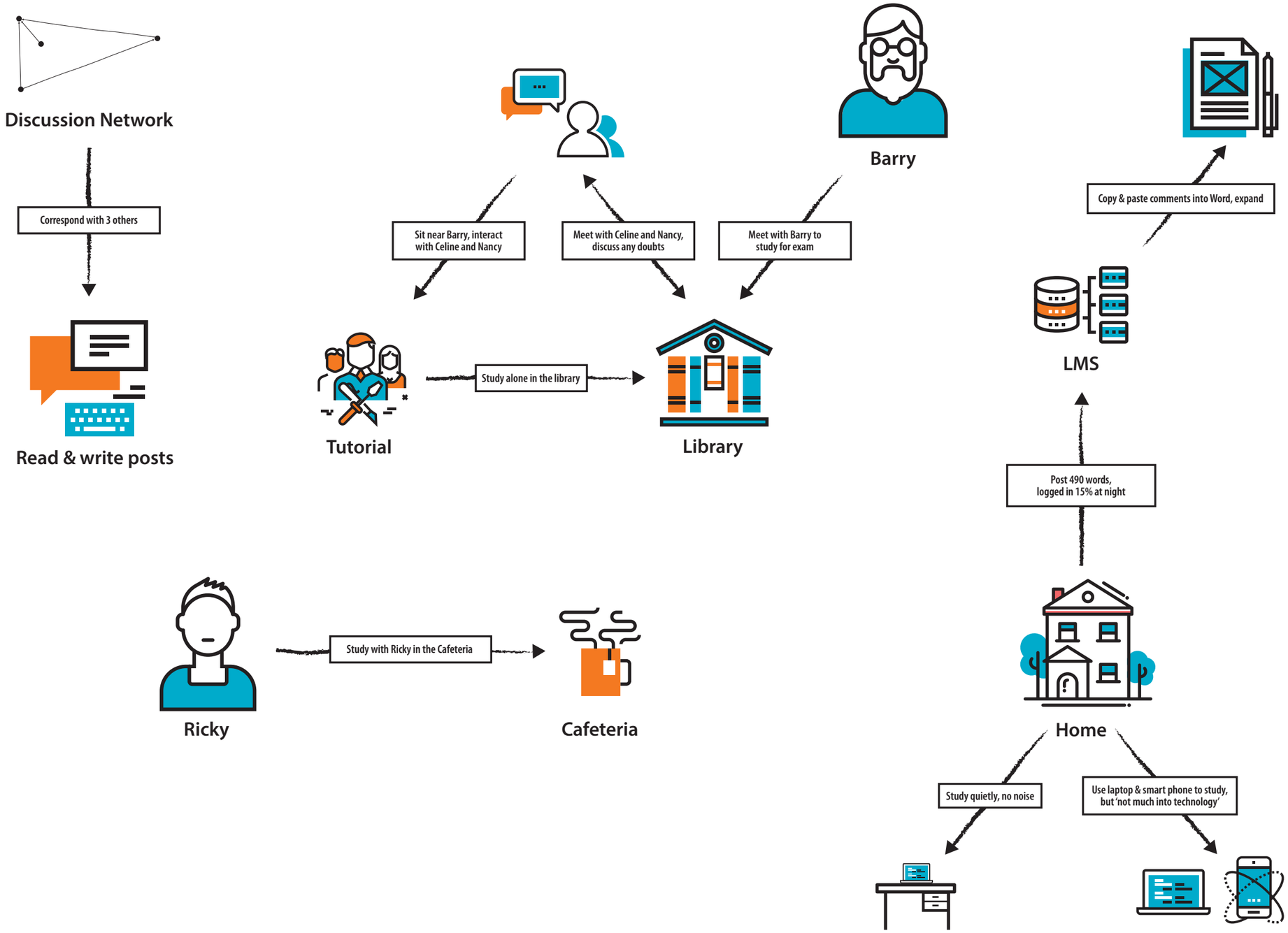


Figure 52: Blended Learner Bill

CONCLUDING REMARKS

In the preceding discussion, I explored small-scale hybrid learning networks, sometimes provisional and sometimes stable, held together in their practices. Each blended learning encounter could be said to have its own localised and particularised practices, even for members of the smaller groups described in the three data chapters. Taking a relational perspective has provided an alternate frame by which to 'think' blended learning. This alternative contrasts with the views of some institutionally-defined blended learning models in higher education. These often project blended learning as an integration of delivery modes, teaching models and adoption of a strategic approach to the use of technology (Bath & Bourke, 2011; and Saliba, Rankine, & Cortez, 2013[80]). Interventions, desired results, integration, teaching models and strategic approaches are some of the black boxes that prevent blended learning from being seen as an effect of sociomaterial practices.

Thus, rather than the 'networked student', I see students themselves as networks intra-acting with other networks, the effect of which is something that has become characterised by others 'looking in' as blended learning. Once the 'black boxes' of blended learning are examined more closely, the opportunity for and value of engineering or designing 'in' learning features that can transform students through interventions is debateable. A more thoughtful design might ensue when learning as a dynamic and shifting sociomaterial practice (learning-in-the-making) is included as a matter of concern, something I turn my attention to in the following and final Chapter.

80. These exemplar views appear in documentation for Griffith University and the University of Western Sydney. These and other policy documents have the difficult task of promoting (or advocating) an organisational imperative managing resources efficiently and effectively, while at the same time positioning the institution as having a student-centred approach to teaching and learning. While these two objectives are not necessarily mutually-exclusive, they are challenging given the complexity of delivering large-scale, engaging educational programmes in higher education.

Chapter 8

Endnotes: A VTC Context

> *"Everywhere we turn, if we choose one thing we must relinquish others which, in different circumstances, we would wish not to have relinquished"* (Lionel Robbins, 1932)

My goal in this study has been to explore the question of what 'counts' as blended learning. To do this, I have examined the learning practices in the everyday experiences of students in a business communications course at VTC. I have considered what it is that constitutes blended learning by taking a sociomaterial approach – one in which *blending* learning is constituted as a material practice. Rather than finding blended learning reified as an intervention – a learning design – I found it in the actions of the everyday encounters of talk, notes, devices, movement, buildings and bytes. Instead of accepting blended learning as a split of seat-time and digital practices 'out there', I found it to be a continuation of emergent, hybrid, embodied, digital practices. Blending was an effect that emerged in what gets done at home and on campus, waiting for class, driving, riding public transport, 'getting in early' and myriad other practices that hold together learner co-agents, like those shown in the preceding Chapter – Jane, Merryn and Bill[81].

In the previous chapter, I suggested that understanding the identity of these learner co-agents might inform some observations about blending in the VTC context. Here, I speculate on how blended learning might with profit be reconsidered as a sociomaterial educational practice, and what this might mean in the VTC context. In what follows, I outline what I call 'action-investigation scenarios', perhaps with the prospect of strengthening desirable realities that might otherwise be weak (Law, 2008). Initially, I describe two broader and significant limitations on the VTC teaching and learning environment. Several action scenarios are then explored including: having 'internet friends', 'taking things seriously', and 'legitimate participation by peripherals'. I then reflect on my technology-learning journey, which as I alluded to in Chapter 3, started formally in 1987.

The VTC Setting: Economics in Practice

The reference to Robbins (1932) above is an acknowledgement of the setting of my research: in a Faculty that teaches economics. Economics, the study of scarcity, is a core subject that

81. See Figures 50-52.

students must complete in their degree, along with business communication, in their first year at VTC. Merryn described her experience of 'knowing new things' (p.106) by listening to Floyd ask questions in her economics class. Scarcity is well known within and beyond the classroom at VTC – government spending in the VET sector has been flat for the past nine years (Wheelahan, 2017). The management of VTC face difficult decisions about how and where to invest funds, with choices between spending on: building infrastructure, ICTs, academic or support staff 'head counts', staff development and a host of others. As I illustrated in Chapter 5 (p.95) when Larry's small discussion group convened off-campus at 'Maccas', seemingly small matters such as the library opening hours turn economic decision-making into blended learning actors (translate this decision-making as these actors). The corollary is that large-scale, or "grand technological innovation" (Whitworth, 2012, p.145) is not a realistic option for the Faculty, at least in the shorter-term, if ever.

Secondly, VTC is bound by the conditions imposed by a regulator[82] that require a certain number of contact hours on campus, depending on the course and the qualification. This is not to suggest that VTC is not able to be creative or innovative in the design and development of their blended learning environment – there are mechanisms that make it possible to vary course content and structures. What it does indicate is that successful change is more likely to be found in local, smaller and evolutionary adaptations in practices. As Star and Bowker (2002, p.159) suggest: "the work of design is in many ways secondary to the work of modification".

'I've got Internet Friends'

The forum became an important site of practices for participants in the study, from Mary's 'internet friends' who helped her out since she needed 'more friends around this subject' (Figure 26, p.80), to Neil, who spent two weeks seeking out his forum correspondent Andrew so they could meet (Chapter 4, p.68). These encounters point to the entanglement of digital and embodied 'doings' around the forum relating to the social aspects of learning at VTC. Compatriots met and developed friendships in the discussion forum (Bill, Dehlia and Chelsea, Figure 29, p.87). Barry felt a need to encourage quieter students from his class through the forum, while in the same class, Celine was able to gather what these quiet students' thoughts were on course topics through their forum contributions, rather than through their class participation (p.106). The course page on Facebook too became an added dimension created by the participants themselves (many of whom also interacted in class, for example the 'Benchmates'). They used it to exchange information and answer questions outside of

82. The Tertiary Education Quality and Standards Agency (TEQSA) who provide VTC's accreditation to operate its undergraduate courses.

the LMS, suggesting a process of becoming 'un-configured' (Woolgar, 1991), differentiating themselves as learners outside of the college ICT environment.

This pointed to two of the significant sites of learning translation at VTC – one formalised and Faculty-driven, and the other informal and student-driven. The Faculty does maintain a high-level Facebook presence (i.e. whole-of-Faculty page) – in a sense an 'official' interface to this form of social media. There are mixed views on how Facebook might help learners in a blended course (Rambe, 2012) and how Facebook might assist in developing student participation in online discussions (Miller, 2013). Yet there is no reason why the LMS and Facebook should be seen as either/or options for the learning design. It could be that there is space for both platforms on the course. One scenario might see the first online discussion – a more social one (Table 4, p.67) – take place on Facebook before students start on their second, more formal one – the literature review.

Despite Aaron's enthusiasm about what social media could do: 'Facebook is the main communication mode we use for today' (Chapter 4, p.81), there were examples of participants who avoided Facebook, like Jane: 'I've chosen not to follow anyone I met at school on Facebook'. This suggests that adoption of Facebook by the study participants was inconsistent, making this a point of investigation for the future at VTC. Practices that might be examined include: the role of social media if it were to be integrated with LMS discussion as suggested above; the types of learning networks that emerge from a more overt engagement with social media and teaching practices; or a comparative review of the discussions between the more formal online tools on the LMS and those on social media.[83]

'Taking things seriously' – including small, mundane things

In Chapter 4, I explored the social bonds forming around how 'seriously' participants took their studies, and how this became a defining practice for members of the 'group of five'[84] (p.63). I also examined how a mundane fixture like the benches in class and the ones adjacent to the Cafeteria helped constitute 'Benchmates' (p.74). For others, like Barry, carrying notes was a sign of competence in his small peer group (p.89). Deanne (Go5) copied and used her notes to provide tuition to her peers as time for exams approached (p.91). Given that the course content was in a set text, and that the supporting slides and podcasts were available to download and print on the LMS, it is curious that physical notes can still act to 'stick networks together' (Chapter 5, p.90).

83. There is a tension that needs to be considered in the use of social media here if integrating or coordinating a Facebook page. While what is suggested in this section might qualify as a 'third' or 'blended' space (Aaen & Dalsgaard, 2015), there is also research that suggests that students perceive a distinct divide between the use of social media in educational and private contexts (Josefsson, Hrastinski, Pargman & Pargman, 2016).

84. Melissa, Jane, Deanne, Ricky and Neil.

Though note-taking is generally studied in relation to representational knowledge recall (Bui, Myerson, & Hale, 2013), practices like carrying, copying and sharing notes have been made visible in this study as sociomaterial practices. For future course implementation, suggesting that students be encouraged to take notes or to use them would hardly be a revelation – for example see the 'generation effect' (Rabinowitz & Craik, 1986). The point to be observed here is the persistence of these seemingly obsolescent technologies alongside newer, more contemporary ones. Providing more opportunities for learning and technologies to coalesce in practices might simply require providing better access to note production facilities (for example installing printers in all the classrooms and the Cafeteria). The provision of some form of physical note holding compendium at course commencement, like those carried by professionals in business meetings might also serve a practical, and potentially identity-building purpose.

While this does not guarantee that certain students will be more engaged or motivated by these small and subtle adjustments, attentiveness to such material practices may well be part of the circumstances required for blended learning to flourish further in the VTC context. Small-scale actionable scenarios like these provide an opportunity for further investigation into how, when and where groups form and relate to the course content through combinations of older and newer technologies – perhaps another 'type' of blended learning?

Legitimate Participation by Peripherals

In Chapter 5, I suggested that at a wider 'becoming professional' level, participants saw themselves identifying with their particular disciplines.[85] This was frequently shown with statements about how the course would prepare them for their profession, or how certain learning tasks would do this. It was the 'outsiders' – mostly trusted confidantes or relatives – looking 'in' who were often called on to assist these learners in developing their professional identity practices. For example, Victor's supervisor at work, a communications consultant at the same workplace and his mother both featured in his description of 'helpful others' during his interview, each helping him in different ways: reviewing an assignment, coaching him on grammar (on Skype), or coaching him in the workplace on 'how to communicate with the corporates' (Chapter 6).

Jane calls on Michael, a small business owner, to act as her mentor. They would discuss how the course was going and some of the topics that had been covered (Chapter 6). Peter calls his sister who studies accounting at a nearby university for help when he is working on assignments (Chapter 6). In the sociograms annotated by the participants at interview,

85. Accounting, Marketing or Administration.

almost without exception, an additional 'outsider' or two were added as 'helpful others' in their learning. The descriptions supporting inclusion of those individuals often involved technology-mediated interactions, locally and in some cases, internationally.

This 'other' community emerges beside and intersects with the subject material, classmates, friends and family relationships. Accordingly, facilitating stronger links with this latent community – perhaps through social media linked to the college – might benefit these students by allowing for participation in a more expansive learning environment (Fuller & Unwin, 2004). In Chapter 7, I proposed that these emerging business professionals might benefit from the opportunity to experience the boundary-crossing that characterises expansive learning environments (through participation in multiple communities of practice, ibid. p.130).

Reaching beyond the Faculty to access business partners or mentors would enrich the blended learning experience for the emerging professional accountant, marketer or administrator. This is not to suggest opening course participation to the 'world', rather the development of an environment that might be more inclusive of designated or 'helpful' others, both individual and organisational,[86] to take advantage of the extended or ongoing nature of the educational experience.

Extending the notion of an expanded learning environment, informal linkages might also be helpful with those in *preceding* cohorts of students undertaking diploma studies at the college[87] who take an interest in joining the degree programme. In Chapter 5 (p.87), Bill, Dehlia and Chelsea 'met' as compatriots on the discussion forum, and although they had studied accounting and had been at VTC for 18 months previously, they were as yet unknown to each other. This is a possible function of a social network application rather than the LMS (see: 'I've got internet friends' above). In effect, the social element of learning might precede the formal by creating the possibility of establishing contact with peers of a familiar culture before joining the course.

Digital Footprints: seeing 'what they think'

The discussion forum is a sociomaterial practice that assembles "heterogeneous natural, technical and cognitive elements" (Fenwick, 2015, p.87), which, as I illustrated in Chapter 5, are constitutive of the blended learning assemblage. In Chapter 5 (p.101), Barry describes how he notices 'quieter ones' in Grace's tutorial and he 'uses' the forum to 'give them a little nudge'

86. VTC maintains strong relationships with certain professional associations such a Certified Practicing Accountants Australia (CPA). I would add to this list existing and potential employers who might take an interest in emerging professionals within VTC.
87. The majority of students entering business degree studies have VET qualifications prior to entry, mostly also from VTC.

so they 'might want to actually start contributing more'. While in the same tutorial, Celine sees what the quiet ones 'think' by reading their forum contributions. The forum also serves as a meeting place for compatriots, who later go on to form small learning networks (Chapter 5). Receiving a message in the forum creates a 'duty' for Merryn to respond (Chapter 4). This well illustrates "thingly participation" (Thompson, 2015, p.4).

But the forum also shows how small breakdowns in an emerging network can impact individuals: these are potential learning encounters that don't come to pass. For example, Victoria's attempts in Chapter 6 (p.120) to develop learning exchanges were frustrated by others preferring to correspond with people they knew from class. Bill described in Chapter 4 how he used various 'snippets' of answers to forum questions to build his own study material, but he made limited contributions himself to the forum. Though Bill gained from the contributions of others, his learning practice of 'lurking' could perhaps have been built on to benefit other students on the course. Two illustrative (rather than prescriptive) practices might benefit future students at VTC in online discussions when these sorts of unrealised learning encounters occur: (1) providing some additional structure for the learning exchanges in one or more of the discussions (Hara, Bonk, & Angeli, 2000); and (2) providing for anonymous exchanges in certain discussions (Roberts & Rajah-Kanagasabai, 2013).

While it is clear that many of the participants benefitted from the discussions (Mary, p.81; Jane, p.98; and Melissa, p.101), it may be worthwhile considering other learning structures that might further enhance forum practices. Hara, Bonk, and Angeli's (2000) design for a sequence of discussions is illustrative. In each case, smaller discussion groups were assigned based on tutorial attendance, with one student being formally required each week as a discussion 'starter', and another as a discussion 'wrapper'. This created a relatively simple structure for the discussions on a weekly basis, resulting in escalating participation towards the end of the course. In the present study, discussion contributions tailed off after the second, formal discussion (Table 5, p.98). Some additional structure might help sustain discussion contributions over the full duration of the semester.

In the case of where individuals might be isolated due to their lack of being 'known' in online discussions (like Victoria above), allowing for anonymous discussion exchanges may avert the tendency noted here (and elsewhere, see Stevens, 2013) for participants to 'correspond with friends'.[88] This might be implemented in perhaps the final two discussions to allow for more socialisation in the earlier exchanges.

88. This is not a value judgment about 'corresponding with friends' – indeed it may be just as constructive for learners to be able to relate to known peers. Like the Facebook/LMS 'choice' issue above, this is not an either/or, since there are four discussions in the subject design, allowing for a hybrid design.

The action scenarios above do not require substantial 'technical fix' solutions, they can be implemented within LMS settings and through organisational techniques at the tutorial or subject coordinator level. Small, particular, localised changes like these might be tried and followed up through further investigation of blended learning practices at VTC.

Technological Solutions in Search of Educational Problems?[89]

I end my action-investigation scenarios where my blended learning data stories began – on campus and in the classroom. Traditional classrooms are thought of as teacher-centred, and can be subject to criticisms of how they are arranged. The rows of desks and computers on the VTC campus do portray a conventional learning space (Chapter 4, Figures 11 & 17, p.65 & 76). The question of expenditure on substantial re-fitting and redesign of architecture and technology is another economic conundrum for VTC. Taking class-based contact hours as a given, proposing a re-fit of the classrooms to provide flexible learning spaces seems tempting. However, Whitworth's (2012) example of "grand technological innovation" is illustrative of why significant expenditure might not be warranted. In that case, a flexible learning space that incorporated computer-based technology, writable surfaces, movable walls to accommodate immersive environments and collaborative work were installed, and laptop computers were provided for students. Despite significant investment, the project was not judged successful after evaluations from all of the stakeholders' perspectives,[90] however it did serve as an exemplar that influenced other learning space development (technology-architecture projects) around the university. Whitworth (2012) refers to this as the "invisible success" of the project.

Given the lively, embodied nature of the learning practices in three of the four tutorials in the study, but with the limited resources available to VTC, it is possible that some other form of physical transformation in the classrooms could be achieved that might benefit blended learning. For example, by re-configuring a room into a collection of 'pods' – four or five workstations, each in a circular formation and spaced apart in a 'stand-alone' mode – the space between the pods would become more open and accessible for the meshing of embodied and digital practices. Students at each of the pods might communicate across space like the benchmates did (see Chapter 4). Albeit that no formal analysis of space usage was made in this study, this is a low-risk and low-cost modification of a physical space that may well promote the practice of classroom-based blended learning at VTC. Accordingly, it is an avenue for further investigation.

89. To misquote Bigum (1998).

90. In Whitworth's (2012) case study, the stakeholders consisted of students, teachers, management of the university and the vendors of the various 'systems'. Each of these stakeholders are present in the VTC context. It is noteworthy in Whitworth's study that the student group considered the innovations very favourably.

AN ACTIVITY HUB OR AN AGORA?

While clearly resources are limited for institutions like VTC, thought might still be given to creating a more student-centred learning environment on the wider campus (Jamieson, Dane, & Lippman, 2005). Operating hours, technology access (hardware and software) that meet with the needs and expectations of VTC students might allow for a more hybridised-in-use set of practices to emerge, in the same way that the participants in this study adapted their existing blended learning environment through bricolage (Chapter 6, p.113). Bleed (2001, p.22) describes a Community College campus in the USA where there is "a one-hundred-station open computer lab, deli lounges both inside and outside, a tutoring centre, a career counselling centre, and a testing centre— all in one facility where food, counselling, testing and tutoring are all intermixed".

A library or Cafeteria re-build is unlikely to be budgeted in the same way that the classrooms might not be up for 'grand technological innovation' (economics again), however there is already an existing, lively space on campus that may be adapted into a hybrid-in-use space – an Agora of sorts. In Chapter 4, Mary and Merryn met on the 'benchtops' near the Cafeteria (Figure 22, p.79). This is a wide, bright, quadrangle between the library and the Cafeteria. There are several benchtops and some attractive outdoor artworks already in the space. But the space becomes inhospitable during periods of inclement weather. The space lacks a connecting, covered walkway. There is potential to link the Eastern side of the library and the Western side of the Cafeteria, perhaps via a cloister. An all-weather space might go some way towards transforming these disparate facilities into a contiguous blended learning space. One that might allow for all-weather benchmates; more going over and sharing notes; more eating, relating and learning become possibilities or, as I suggest in Chapter 7 (p.132) affordance performed.

The creation of activity hubs on college campuses might been termed by facilities managers as the "seamless provision for what might seem obvious" (Fisher, 2005, p.22), with the obvious listed as: "meet n' greet; access to services; quiet spaces; study; relax; eat; play; cultural; and green space" (ibid.). For VTC an Agora/hub might also allow for the *continuation of hybrid, embodied and digital practices – blending learning* – to materialise in new ways and forms. Table 6 below shows the action-investigation scenarios from above summarised, and is followed by some closing remarks.

The 'applications' of the practice of blending learning offered below are not intended as a set of recommendations but rather are illustrative of a renewed concept of blended learning which I consider to be the main contribution of the work undertaken here.

Practice	Action-Investigation Scenario
Having internet friends mediated by an LMS or social media	Consider hybrid configurations for blended learning of the LMS and social media (e.g. Facebook) Conduct some learning discussions on social media to supplement the LMS forum Investigate the LMS/Social Media learning assemblage (if implemented)
Take *things*, even mundane ones, seriously	Provide better access to note production (e.g. a printer in every tutorial room and in the Cafeteria) Provide for some form of physical note-taking collection and carriage for all business students on course entry Investigate how, when and where learning practices coalesce around new and obsolescent technologies as a form of 'blending' Investigate affective practice around other 'types' of blending and how this influences identity development in learners
Legitimate participation by peripherals	Establish a more focal link (beyond general 'Faculty' ones) to the wider community through social media – engage with the expansive learning environment construct Allow pre-course entry Diploma students to become involved in some form of online discussion prior to commencing the course Explore the nature and composition of learning networks that emerge through relations that develop through both the wider and pre-entry avenues
Leverage 'seeing what others think'	Provide additional structure for one or more of the discussion forums on the LMS (e.g. by employing the 'starter-wrapper' technique) Provide for certain discussion forum activities to have anonymous postings and responses Examine the small and incremental changes to the practices above to see how other actors make a difference in discussions
Consider alternative tutorial room configurations	Move from rows to 'pods' Examine the nature of embodied and digital learning practices that emerge from pod-classrooms
Create a more student-centred learning environment on the wider campus	Move towards a contiguous space (potentially a 'hub') between the library and Cafeteria – an 'Agora'. Explore how the provision for sociomaterial learning practices in a more connected and hybridised (hub) facility results in different performances of those facilities and of blended learning itself

Table 6: Action-investigation scenarios for VTC

Reflections of a novice ANT-er

When I entered this research project, I would have considered myself a "reflective practitioner" (Schon, 1983), perhaps in blissful ignorance of my privileged position as a manager in the public sector, then as a teacher of management. As a user of teaching and learning technologies, I brought biases into the study by potentially relating to and finding positive stories in the narratives of the participants in my study. Moreover, I brought a history of using ICTs from my earlier professional working life. As a manager in the public sector

and later a consultant, e-mail, web browsers, search engines and other technologies were commonplace, mundane and simply productivity tools or 'tools of the trade'. This viewpoint was imported into my own practice of teaching management to undergraduate students, in particular my specialist area of managing organisational change. I was, it may seem, a foot soldier of the determinist technology army. But there have been many opportunities for reflection during the conduct of this research, and I have new ways to look at things. This is not going to be 'business as usual'!

While I believe that I have learned a great deal over these recent years as a teacher-researcher (a different and unsettling role at times), I consider that it has been necessary for me to also 'unlearn' certain things. One thing that I needed to unlearn was the notion that it is strange to appear in the narrative of one's own research. Another was the notion of there being a singular or 'one best way' of finding and presenting 'facts' – a kind of research 'efficiency' or reality-producing technique. I needed to open myself to the idea of multiplicity, difference, and to tensions held in place. To be receptive to the messy, emergent performance of method that might yield only a fractured view of reality (Law, 2008). To engage with my chosen methodology meant a need to accept that there might not be a solution to each and every problem that is encountered by 'applying' an appropriate method in glorious neutrality.

Despite the clear differences between myself and the participants of the study, I encountered many 'me-too' moments through the conduct of this research as I read, revised and mulled over the interview transcripts, forum postings and sociograms. My 'reality practices' involved blending learning, sitting alongside with, intersecting, and criss-crossing the paths of my participants. While Neil may have used the library for a 'calculator' (Chapter 6, p.111), I engaged with it as a laboratory. My workspace may seem unremarkable (see Figure 53 below), but it is a privileged one: quiet (no need to share a desk with a roommate – like Jill, Chapter 6, p.114), dedicated (no need to territorialise one's owned and allocated space – like Barry, Chapter 6, p.114), furnished, inclusive of reminders of distant holidays, a comfy chair and a neglected Mac (no need to come to college to use a desk – like Teresa, Chapter 6, p.112).



Figure 53: A blended learning space

Robbed of the pretence that my methods simply describe, I cannot be certain that I have successfully been able to divorce myself from a god's-eye view (Law, 2000) of my participants in the goings-on in the study. But I am confident that I have made myself accountable for the "reality-making practices" that I have employed (Law, 2008, p.640). What remains to be seen is what this means for my own teaching and research practice. Is it possible that I will now find myself 'other' within the dualisms, the rationalisms and the pragmatisms in the teaching of management? Only time will tell.

Appendix: Semi-structured Interview Guide

Introductory Questions

What brought you to VTC?

Tell me a little about your experience in the Business Communication course this last semester (also relates to learning experience)

Student-Student and Teacher-Student Interaction

Tell me a little about your tutorial group

Tell me a little about your interactions with your tutor

Student-Technology Practices

Tell me a little about how you interacted with the resources on Moodle (by resources I mean anything from the links to the course material to the online quizzes)

Do you own a computer? (Branch: if yes, probe how often used, if used to access course materials; if no, *how did you mostly access Moodle this semester?*)

Which technologies did you employ to get access to the learning materials on the course? Follow up: *What about other technologies?*

Student Learning Spaces and the Learning Experience

To help me understand your learning environment, can you tell me a little about where you are living?

(Probes: are you working/ where and on what basis – split of hours; travel time and mode (do you do class work on the train/bus); balancing of work/study/family lives)

Tell me about some of the on-campus facilities you used while studying Business Communications

What did you think about the forum….? (Ask about each of the discussion forums by topic/ purpose of the forum in turn). *(1) Introduction and getting to know others; (2) Post and discuss a literature review; (3) the case study; and (4) write an exam question.*

Context-specific questions

Only those aspects relevant to the particular student to be explored, for example:

- Participation (or not) in each of the four discussions offered including aspects such as: which alters they interacted with the most and least and which influenced their experience

- Particulars of when messages were left: time of day, where were you, (content why did you write this/that) including: exceptional times of day (e.g. posting at 3:00am); or patterns of access to the LMS or routines or rhythms perceived in posting patterns (e.g. every day or particular weekdays)

- Delays between responses from alters (why do you think there were delays; feelings about the nature, length and timing of responses from alters)

- Where and how else did the participant interact in a CMC environment about the course learning materials, assessment items, what was going on in lectures, tutorials or other learning activities (extending on questions above)

- Presentation of the network sociogram and requests for comments about the students position within it (does this fit with perception?)

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