

# **Material entanglement in a primary school learning network**

Pippa Yeoman, Lucila Carvalho,

Centre for Research on Computer Supported Learning and Cognition, Faculty of Education and Social Work, University of Sydney, [pyeo5847@uni.sydney.edu.au](mailto:pyeo5847@uni.sydney.edu.au), [lucila.carvalho@sydney.edu.au](mailto:lucila.carvalho@sydney.edu.au)

## **Abstract**

Activity in learning networks is often digitally mediated. By virtue of this, studies of learning networks have not focused solely on human-human relations, but have acknowledged the role of digital infrastructure in mediating relations between people. This research draws on sociomaterial studies of learning and theoretical approaches from anthropology and archaeology to investigate the connection between *activity* and the *setting* in which it occurs. In exploring relations between humans and things, sociomaterial studies of learning surface the role of materials in learning practice. Whilst sociomaterial descriptions are used to examine the nuanced relations between humans (H) and things (T) they often fail to consider the object nature of things. Archaeologist Ian Hodder addresses this issue highlighting that things are not isolated or inert, that they endure over different temporalities and where we see them as non-things or fail to see them at all, we are unable to trace their effects. In this paper, we argue that educational designers, teachers and others involved in networked learning would benefit from understanding the object nature of things (T) and their entanglement with humans (HT), as they engage in creating new resources for networked learning. Furthermore, it will be fundamental to understanding the changes that these ever-evolving and increasingly ubiquitous technologies will bring to future place-based instantiations of networked learning. This paper discusses these issues through the analysis of a learning network within a primary school context and whilst schools have not customarily been considered sites of networked learning, we argue that the way this school uses online structures to co-ordinate face-to-face activity necessitates the network attribution. Our research is based on an ethnographic study conducted in a digitally enabled, open plan learning space that is home to 180 year five and six students and their team of seven teachers. We present an analysis of a single, seventy-five minute episode selected from 549 hours of observation. Our analysis, whilst particular to this moment in time, draws on what was observed over a nine month period and the encounter was selected as illustrative of the intricate entanglement of place, task and social organisation that is characteristic of learning activity at this site.

## **Keywords**

Materiality, entanglement, place-based learning network, primary school and ethnography

## **The nature of learning networks**

Over the past decade, information and communication technologies have increased in pervasiveness, with connected devices becoming part of people's everyday lives. Many devices are now so easy to carry around they offer learners opportunities to access networks of interest at the park, on the bus, or anywhere connectivity is available. This has led to changes in physical settings and the emergence of new arrangements between humans (H) and things (T) in networked learning environments. These changes challenge traditional notions about relations between humans and things and how these relational dependences play out over time and space. Early descriptions of networked learning focused on how computing technologies were used "to promote connections between one learner and other learners, between learners and tutors; between a learning community and its learning resources" (Goodyear et al., 1998, p. 2). With a focus on the relations between nodes, studies of learning networks have tended not to privilege human-human relationships (Jones, Ferreday & Hodgson, 2008) and this has differentiated them from studies of communities of practice (Wenger, 1999). More recently Carvalho and Goodyear (in press) have described learning networks as being characterised by a greater degree of openness and flux than communities or groups, such that interactions between individuals need not be grounded in familiarity or established relationships. Furthermore, they describe movement as fundamental to networking. "Networking involves travel - of people, objects - or messages. Community need not" (p.10). With

this definition in mind we seek to trace both the movement of and dependences between people, things and information within a primary school context. We examine connections between elements of the physical setting and the activities of people within a learning network that leverages the affordances of low cost mobile computing, connecting students, teachers and parents with learning resources and learning communities - both local and distant. As this connected-collaborative-curriculum was put into practice, staff vocalised a tension between the new way of teaching and the built environment, which they described as “working against” their best efforts to effect change. In response, a second phase of redevelopment was initiated and the resulting built environment together with the digital infrastructure forms a place-based learning network in which the movement of people, things and information can be traced, revealing an intricate entanglement of humans and things. In examining how elements come together in assemblages that influence learning, Goodyear and Carvalho (2013) have identified three central components, namely the *structures of place* (set design), *task* (epistemic design) and *social organization* (social design). Their framework has been applied in the analysis of several online learning networks (Carvalho & Goodyear, in press; Carvalho & Goodyear, 2014; Pinto, 2014), including examples in which the digital elements serve to connect disparate place-based elements (de Laat, Schreurs & Sie, in press; Nicolajsen & Ryberg, in press). In this paper we examine a place-based learning network where the very physicality of the learning space is born out of the mobility and openness inherent in the digital elements. We argue that emerging technologies have and will continue to give rise to new spaces for learning, and so educational designers, teachers and educators need to understand their effects on learners’ activities. We draw on sociomaterial theories of education (Fenwick, Edwards, & Sawchuk, 2011; Sørensen, 2009) and theoretical approaches employed in both archaeology (Hodder, 2012) and anthropology (Ingold, 2011, 2013). After a brief description of the site, the learning encounter is presented in detail, followed by an analysis of the observable phases of activity and a discussion in which we explore the entanglement (Hodder, 2012) of place, task and social organisation, using the framework developed by Goodyear and Carvalho (2013).

## The sociomaterial turn in educational research

If people read spaces for cues (Norman, 1990), much in the same way they would scan the contours of a landscape when walking, or the expressions on a face when engaged in conversation, how then should we think about the physical forms that make up our learning environs? Is the ‘set’ more than a backdrop against which learning activity plays out? How has ubiquitous access to curriculums changed the physicality of the classroom and do flexible heterogeneous furnishings, rather than fixed homogenous ones really give rise to different forms of social engagement? The notion of affordance, raised by these questions, is central to understanding the manner in which *object-like* and *place-like* entities affect activity. In this paper we use the term affordance to mean the way in which an object suggests “to the perceiver what use it might be to them and how it might be used” (Goodyear and Carvalho, in press, p.260). In trying to answer questions like these, Fenwick, Edwards and Sawchuk (2011) make the case for a ‘sociomaterial turn’ in educational research. At the heart of their argument is a challenge to the centring of human processes in learning - in favour of the materiality of learning. This shift does not come at the expense of the personal. Instead it seeks to deal even-handedly with both the material world and human experience in order to explain how entities, knowledge, other actors, and relations of mediation and activity are employed in practice. Whilst we identify with the need to consider the material, we find it difficult to accommodate notions of symmetry as applied in Actor Network Theory (Fenwick et al., 2011), for they seem to artificially reduce the complexity inherent in place-based learning networks, making them harder, not easier to understand. As such, we rely on Tim Ingold’s (2011) rendering of agency in which he describes the attention to movement or the coupling of perception and action - in activity, as imbuing the doer with agency. In his definition there are both scales of agency (aphid to human) and variability in skill - the ability to match one’s physical movements to the perturbations one perceives within the environment, without interrupting the flow of one’s action. Thus the skilled practitioner develops through (inter)action with the environment. This being so, Ingold develops a theory in which ‘a lack of skill’ does not render ‘things’ irrelevant. Far from it; he calls for an understanding of the world that encompasses materials which flow, mix and mutate along lines which converge, tangle and link to form a meshwork in order that we do not lose sight of our connectedness to all things, and all things to us (Ingold, 2007). He cautions that the notion of materiality very often acts to obscure the qualities of the materials being described; and asks us to consider both the things we cannot touch, and the phenomena we experience through our senses. Many of these ideas resonate with the activity centred approach taken by Carvalho and Goodyear (in press) in working towards an understanding of the connections between the physical (material and digital), the epistemic and the social structures of learning networks; and their effects and influences on learners’ activities. What becomes clear through the lens of a sociomaterial perspective is that increased connectivity has given rise to increased dependence, in which an understanding of the constituent parts fails to explain the complexity of the whole. However, in our rush to

apprehend the relations between the many and varied parts we should not lose sight of the properties and qualities of things, by privileging relational accounts of matter at the expense of the object nature of things (Hodder, 2012). As such, there is much to be gained from pausing to draw insight from perspectives outside of education as we consider the role of 'the set' in educational environments.

## Insights from anthropology and archaeology

In the case study presented we trace both the object nature of things and their connectedness to other things and people and consider their effects on the activities of this learning network. Drawing on the work of Tim Ingold (2011) in anthropology and Ian Hodder (2012) in archaeology we explore how their insights might be brought to bear on research in learning networks. How might this shift in attention from the relations between things, to the qualities of things, work in practice? Consider a surface upon which to write. A clear flat surface that holds either a permanent or semi-permanent trace in a form that affords transmission - or travel. Examples that easily come to mind include: paper in its various forms; black, green or white boards; smart boards; computers and tablets. On reconsidering the material properties mentioned above one might add to this list a number of other surfaces that could hold a semi-permanent trace: glass windows and doors, stainless steel tables and, where covered in whiteboard paint, walls. On apprehending the benefits to be had using these surfaces one might seek them out in a more portable form (e.g. small A5 whiteboards). Having done so, how would the presence of these objects change the process of selecting a surface upon which to write? How does the relative permanence of paper outweigh the semi-permanence of a whiteboard; and how do the digital affordances of sharing, tagging, transmission, the ability to search and long term storage outweigh the tangible affordances of paper or whiteboards? Furthermore, having altered expectations about what is possible and what is desirable (Goodyear & Ellis, 2008) - how has learning activity been shaped by the object nature of things? It is to this object nature of things that Hodder (2012) turns. Entanglement, he says, gives us a way of talking about that "something that endures beyond the flows, networks and systems" (p. 212) and starting with the dialectic between dependence and dependency - between humans and things and the centrality of the temporal, wherein order and sequence govern human-thing entanglements. He describes the sum of all dependences between humans (H) and things (T) in their many forms (HT, TT, TH, HH) as giving rise to entanglement in which fittingness is described in terms of function or affordance, and fit or the coherence of the whole, such that when a combination of circumstances creates a disturbance, a fitting solution is selected from what is available. Hodder's (2012) theory in combination with Carvalho and Goodyear's (in press) framework forms the basis for our analysis. What follows is an overview of the site and the methods used in collecting data.

## A learning network within a primary school context

### Overview of the site

Northern Beaches Christian School (NBCS) is an independent pre K to 12 school on the outskirts of Sydney, Australia. It is shaped by a culture of open innovation and research-based practice amongst staff and in keeping with this they have asked to be named in this study. All individuals have been assigned pseudonyms. In 2005 they initiated a ten year plan to reshape their curriculum to accommodate collaboration and differentiation using computing technologies (Harris, 2010). Starting with a Moodle based learning management system (LMS) and later a school-wide Wi-Fi network, resources were focused on the provision of digital connectivity, rather than digital hardware. In line with this a school website was created providing information for external audiences and a link to the NBCS Portal which redirected internal audiences to one of five destinations: learn.NBCS - the high school LMS; HSC.online - accredited year twelve courses offered state wide; PETE - Primary education through e-Learning, the primary school LMS; email services; and myNBCS - linking parents and students to individual academic reports. Initially all classrooms were supplied with a limited number of Internet connected desktops, an audio-visual projector, and access to sets of netbooks and a computer laboratory. In 2011 a phased approach was taken to implementing a bring-your-own device (BYOD) programme and by 2013 all students from years five to twelve were required to have their own personal-digital-device (PDD). Within the school is a space called the Zone, home to 180 year five and six students, their team of seven teachers and for a time an ethnographer. It is a large light-filled space (Figure 1a) on two levels (Figure 1b) furnished with an assortment of moveable, purpose-built furniture designed to facilitate different types of activity. Not visible in these images is the digital infrastructure: the Wi-Fi network, PETE (the primary LMS), and Edmodo (the educational social networking site). This agile, open plan environment can accommodate various social configurations: the entire group of 180 students; two, three or four groups based on year-group, interest or ability; or six home-classes. Of the seven member staff-team, six were responsible for one home class each, and the seventh was the co-ordinator for the two years. Most literacy and numeracy teaching was done in two or three groups, with students

grouped flexibly according to proficiency and teaching done in teams. Each student had their own PDD, four paper workbooks and limited storage. School days were divided into four with numeracy and literacy in the first two learning sessions and project-based work in the last. The third accommodated sports, visual arts, Italian or joint assemblies and when unallocated it was used to supplement where necessary.



**Figure 1a: The upper section of the Zone (left); Figure 1b: The lower section of the Zone (right)**

Logging into PETE gave students mobile access to all their work, which they navigated by term and learning activity. Numeracy and literacy tasks were laid out by week and included pre-learners (homework activities previewing content to be covered in class in the coming week), set-work, additional resources and extension tasks. Project work was contained within a thematic grid that students navigated by interest (multiple intelligences: people, logic, body, music, spirit, picture, self, word or nature smart) on one axis, and by Bloom's taxonomy (remember, understand, apply, analyse, evaluate and create) on the other in order to select a task. Each task had a task-card which included the aim, steps and resources required and multiple hyperlinks to additional websites, templates and tools. Some tasks were designed to be completed by individuals and others were either difficult (video presentation) or impossible (moot court, or debate) to tackle as an individual.

### **Data collection**

Conducted as ethnography, detailed participant observations (Hammersley, 1981) were carried out by the first author between April and December of 2012. Field notes supported by digital photography and video were used to record 549 hours of observation over 92 days. In addition to physical observational data, screenshots of digital learning environments, building plans, notes on furniture design, and other formal and informal documentation was collected to assist in triangulation (Delamont, 1992). Observations were guided by Sørensen's (2009) 'minimal methodology' through which the researcher seeks to describe both how materials participate in practice, and how we account for their participation. In doing so, moments of interest were identified and registered as vignettes. What follows is a single vignette, a detailed description of an episode of activity, selected for its rich detail and ability to represent activity characteristic of this environment. Then, processing observational data through theory, we analyse the phases of activity before moving on to a discussion in which we consider the set, epistemic and social entanglement of activity within this learning network.

### **Vignette: Ms Talbot's revision workshop**

#### **15th October 2012 | Learning Session 2 | Numeracy**

As the group assigned to the revision workshop with Ms Talbot gathers around her on the carpet she says "I'm thinking of a number between 0 and 0.6, what is it?" One student offers "Zero point twelve" and she says "No, but I'm glad you said it like that because we need to talk about how we say decimals." They finish one round of guessing and as the group settles she details what will be happening. Those who received less than a 'three' (achieving at grade level) on the topic test are with Mr Hughes for the remainder of the week. Those who received a three will do a workshop with her today, and those who received a four or a five are to work independently on this week's set-work, followed by extension tasks, both of which can be found on PETE. Ms Talbot asks those left on the carpet to move closer (Figure 2) while Ms Bailey checks a list on her laptop to make sure that all those who need revision are amongst the group. Ms Bailey is seated a little to the left of the large screen (just out of sight in Figure 2). Sitting at a high stainless steel bench, loading pre-learners onto PETE, she uses her vantage point to keep an eye on those working independently and those at the back of Ms

Talbot's group. She is approached by a student who does not know where she should be. After checking an online list Ms Bailey nods in the direction of the workshop and the student runs to join the group on the carpet.



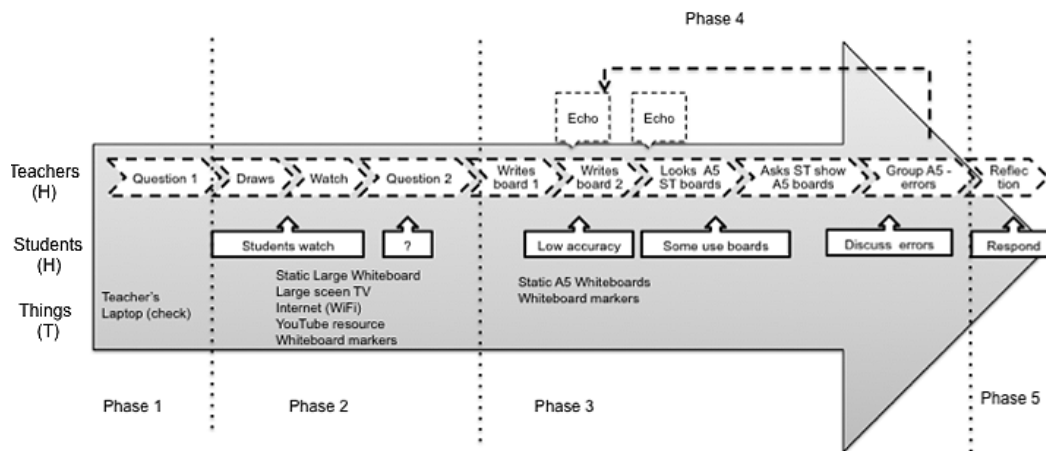
**Figure 2: Students gathered for revision in the upper section of the Zone.**

Ms Talbot initiates the revision by drawing a number line on the whiteboard to the right of the large screen (Figure 2). It starts at zero and ends at one. The decimal points between are marked and labelled. As she sits down on the floor with the students she asks "What would half be?" Some call out answers - they are incorrect but keep guessing. She stops them and using the number line on the large whiteboard she repeats the format she is looking for - percentage expressed as a decimal. They try a few more with limited success and then she plays a YouTube video on the large screen. The instructor in the video makes his way through the worked example and on the other side of the room some of the independent workers stop what they are doing and watch. The volume is not high and it must have been the movement of the video in their peripheral vision that attracted their attention. In contrast, a couple who should be watching are talking and without lifting her head Ms Bailey says, "You guys need to get this." An earlier offender who could not stay on task is sitting next to her - he is working now. Ms Talbot rewinds the YouTube video, pauses it and sits back down on the floor. She asks another question and the students are still slow to respond. In the absence of a volunteer with an answer someone asks "What was the question?" Others admit their confusion and Ms Talbot smiles wryly. Taking a deep breath she gently bites her lip in contemplation and rocking back on her haunches she looks from the students to her immediate environment. And as she exhales and rocks forwards, she takes a small A5 whiteboard from the tub on the floor in front of the large screen. She writes the problem on it holds it up and uses her finger to track as she reads the question out loud. They talk through the problem as a group and she uses the palm of her hand to rub it out before writing another. She repeats the sequence and a few students reach for small whiteboards of their own. One hunches over the whiteboard on her lap and works alone. Another is sprawled on the floor with a whiteboard in front of him - his friends hang over him and point to an error, they solve the problem together. As the lesson progresses, more and more students help themselves to whiteboards from the tub. As they work Ms Talbot can quite literally see representations of their thinking and many are still making mistakes. From this point on, when calling for answers, she asks for those with whiteboards to hold them up. She makes the revealing of the worked example part of the asking-and-answering of the task, rather than a punitive response to repeated failure. At one point she groups a few of the boards together on the floor and asks the students to identify the common error. They discuss the error and move on to the next problem. As the learning session draws to a close Ms Talbot acknowledges that many still "don't get it" and that it is a difficult but important concept. Before they leave she calls for a thumb-o-gram: "How did you feel at the beginning?" Stretching, yawning and chatting, thirty-odd-hands with thumbs down are raised into the air. "How do you feel now?", some of the thumbs go up, they laugh, she laughs and they make their way out to recess.

## **Analysis and discussion: Material entanglement**

A finer grained analysis of this vignette reveals five transitions (see Figure 3) in which the entanglement of the social, the set and the epistemic can be traced. Furthermore, in having documented this progression we illustrate the utility of applying Hodder's 'equation' when considering the emergent activities of co-construction and co-

configuration in complex, networked learning environments. Some transitions are more subtle than others. However, in following the materials in use, phases of activity are discernable and when considered as part of a larger corpus of data, patterns of activity are clearly recognisable.



**Figure 3: Phases of transition**

Phase 1 opens with Ms Talbot, who does not wait for stillness and quiet but initiates a guessing game. There is a sense that students should be ready to work and whilst instructions are given the game-in-action serves as a centre, drawing students in - priming them for what is to come. It also provides a bridging period accommodating movement into and out of the group as students establish where they should be. Phase 2 starts with the planned activity for the workshop. Ms Talbot draws a number line on the large static whiteboard, sits down, and asks "What would half be?" The students guess and within the context of the earlier 'game' this is not completely out of context. In response Ms Talbot points to the number line - a visual clue - and explains what she is looking for. She asks another question, and they are still muddled. Rather than explain a second time in her own words she selects an alternate tool, one that affords a different representation of the epistemic content of the task. Playing the YouTube video on the communal screen, she pauses it to comment on the external tutor's strategy and when he is finished she leaves his completed example visible on the screen. Sitting down, she asks another question inviting the students to have a go at verbalizing their understanding of the problem. This time she is met with "What was the question?" The students are not being disingenuous; some of them really cannot remember the question. This marks the end of what had been planned and the beginning of an emergent strategy using the tools at hand. Phase 3 starts as Ms Talbot reaches for the A5 whiteboard on which she writes the problem. Holding it up for all to see she verbally repeats the question. Participation increases but accuracy is still low. She wipes the board clean and writes another question on it. As she does this, some of the students adopt her strategy and help themselves to A5 whiteboards on which they complete the problem. Many of them have their PDDs and workbooks on the floor with them and there is a box of scrap paper to the left of the large screen but the only writing that happens is on the A5 whiteboards. Of those working on the whiteboards some work alone, others spontaneously work in pairs, and others watch and listen. When Ms Talbot asks for answers, a few more put up their hands and she selects an individual to respond. The answer given is correct but from where she sits she can see multiple boards with errors. She does not call on those who have made mistakes but initiates another change in strategy. Phase 4 mirrors Phase 3 but for one important change. When Ms Talbot calls for the answer she asks those with whiteboards to hold them up - to reveal their answers in unison. Her manner and tone make this an extension of the call-and-response of earlier verbal exchanges. Acknowledging those who are correct and pointing to an error common to a few boards, Ms Talbot re-assembles the materials in a new configuration on the floor, which in turn affects the social organisation as students draw closer to the boards to identify and discuss the common error before attempting the next question. Ms Talbot repeats this sequence a number of times using the same method and materials until the end of the learning session. Phase 5 sees her leading the group in a shared reflection of their progress. She starts by acknowledging that they have found the concept difficult to master and follows with an invitation for them to physically demonstrate their feelings. Using the thumb-o-gram she gets them to contrast how they felt at the beginning of the workshop with how they felt at the end. This light-hearted reference to the act of 'liking' was a moment in which the digitally mediated social interaction of Facebook (or in this case Edmodo) was reflected in their physically shared present. In each of these moves we have seen Ms Talbot select an alternate tool, one that affords a different



representation of the epistemic content of the task at hand. Initiated by constraints inherent in the medium or in the students themselves, she leveraged what was available to her in the set, within the social norms of the group, to accomplish the epistemic aim of the workshop. These implicit norms included social agreement about what students were permitted to do, making it possible for them to help themselves to different tools, or decide to work individually or in small groups. What this reveals is how the activities that unfold within the context of this lesson are connected to elements in set, epistemic and social design. In terms of Carvalho and Goodyear's (in press) framework an analysis of set design could focus on the selection of tools within a prepared environment. In Phase 2 this might lead one to consider the constraints of fleeting visual and auditory cues (YouTube) in the absence of static visual cues (whiteboard), and whilst an appreciation of these material differences is productive, it is not the whole story. For if one were to shift one's focus to the epistemic framing of Phase 2 one would see that connectivity, problem solving and discovery are valued and contribute to shaping activity, as does the social framing in which collaboration, discussion and respectful critique form part of daily practice. As such, it is important that we consider each in turn before reassembling the nuanced interplay of the whole in which the entanglement of humans (H) and things (T) plays out in phases of activity which can be placed along the progression of entanglement illustrated in Hodder's (2012) equation:

E (entanglement) + fittingness + conjunctural event → problem → fixing → selection → E' (total entanglement)

In Phases 1 and 2 we see the environment in action in which fittingness relates to what is acceptable in this environment. Phase 2 describes the conjunctural event in which people (both near and far) and things (both digital and physical) come together in a mismatch which gives rise to a problem. The students, already battling with the concept, find it difficult to remember both the problem and the method for solving it without support. In Phase 3 we see Ms Talbot 'fix' the problem by selecting another tool that is a better fit in terms of function and acceptability given the altered circumstances. The small whiteboard provides a surface that temporarily holds a written trace in a static form that is visible to the group. This move is emulated shortly after by some of the students, who select the small whiteboards for the ease with which they can write, erase and rewrite their solutions in a form that persists long enough for them to volunteer an answer. Both adjustments resolve the same constraint but the physical properties of the boards serve slightly different immediate needs: communication in the case of the teacher and calculation for the students. Phase 4 could be described as an altered entanglement which loops back into activity until concluded due to time constraints. Whilst this specific sequence is brought to an end in Phase 5, the practice was not. It is one that continued to appear throughout the remainder of the year in circumstances in which the affordances of these small whiteboards were fitting: to mark destinations, to hold instructions for individuals or groups, to name parts of a sequence which could then be physically reordered, to suggest alternate arrangements of furniture, or to leave messages - in a form that was more permanent and public than a post-it but more transient and informal than an email.

## Conclusion

Entanglement starts with things - how people use them and become dependent on them. It is compounded by the fact that these things (YouTube and whiteboards) require other things (power, internet connectivity, a screen, speakers, a computer, and a whiteboard marker) and other people (the external tutor and the local teacher), which leads to greater degrees of entanglement. Furthermore, this lesson would not have taken this form had the students not been part of a larger whole, a network, in which people, objects and messages travelled, connecting learners, teachers and parents to learning communities and learning resources - both near and far. Carvalho and Goodyear's (in press) framework for the analysis of learning networks, in combination with Hodder's (2012) perspective on entanglement, supported our understanding of how connections between things and humans were made as we explored the influence of place, task and social organisation on activity in this primary school context. Revealing that one absent the others is only part of the story and that our inability to adequately describe complex, computer mediated learning networks, dispersed over time and space has perhaps impoverished our ability to participate in the design of productive learning networks that meaningfully engage with the physical, the social and the epistemic. Moreover, an appreciation of the object nature of things, the way they afford or 'stand-in-the-way' of certain activities, opens a window into a complex learning network in which the physical and the digital merge - in entanglement. Mobile technologies have untethered the learner. Learning can and does happen anywhere and at any time. The set, an element that was already under-theorised, can no longer be ignored or viewed as the stable, immutable backdrop provided by institutions. Rather, we suggest that it should be considered the co-constructed medium in which learners are immersed. Furthermore, if learning is bound up in the refining of skill, it is - from an Ingoldian perspective, about the development of agency in the learner, immersed in an environment which consists of both humans and things. We acknowledge that this is a

single case, and this school an outlier in educational terms; however, it is one that through repeated cycles of innovation remains sustainable in an ever evolving landscape. In a world full of examples of what-not-to-do, we hope that by describing the entanglement of humans (H) and things (T) in this place-based learning network we might begin to shed light on what-could-be.

## References

- Carvalho, L., & Goodyear, P. (Eds.) (in press). *The architecture of productive learning networks*. New York, NY: Routledge.
- Carvalho, L. & Goodyear, P. (2014) Analysing the structuring of knowledge in learning networks. Proceedings of the 9th International Conference on Networked Learning 2014, Edited by: Bayne S, Jones C, de Laat M, Ryberg T & Sinclair C.
- de Laat, M., Schreurs, B. & Sie, R. (in press). Utilizing informal teacher professional development networks using the newtork awareness tool. In Carvalho, L. & Goodyear, P. (Eds.) *The architecture of productive learning networks*. New York, Routledge.
- Delamont, S. (1992). *Fieldwork in educational settings: Methods, pitfalls, and perspectives*. London: Falmer Press.
- Fenwick, T., Edwards, R., & Sawchuk, P. (2011). *Emerging approaches to educational research*. Oxford: Routledge.
- Goodyear P., & Carvalho, L. (2013). The analysis of complex learning environments. In H. Beetham & R. Sharpe (Eds.), *Rethinking pedagogy for the digital age: Designing and delivering e-learning*. New York, NY: Routledge.
- Goodyear P., & Carvalho, L. (in press). Framing the analysis of learning network architectures. In Carvalho, L. & Goodyear, P. (Eds.) *The architecture of productive learning networks*. New York, Routledge.
- Goodyear, P., Carvalho, L. & Dohn, N. (2014) Design for networked learning: framing relations between participants' activities and the physical setting. Proceedings of the 9th International Conference on Networked Learning 2014, Edited by: Bayne S, Jones C, de Laat M, Ryberg T & Sinclair C.
- Goodyear, P., & Ellis, R. A. (2008). University students' approaches to learning: Rethinking the place of technology. *Distance Education*, 29(2), 141–152. doi:10.1080/01587910802154947
- Hammersley, M. (1981). Using qualitative methods. *Social Science Information Studies*, 1(198 1), 209–220.
- Harris, S. (2010). The place of virtual, pedagogic and physical space in the 21st century classroom. Proceedings of the 3rd International Conference on Information Communication Technologies in Education 2010.
- Hodder, I. (2012). *Entangled: An archaeology of the relationships between humans and things*. Chichester: Wiley-Blackwell.
- Ingold, T. (2007). Writing texts, reading materials. A response to my critics. *Archaeological Dialogues*, 14(1), 31–38. doi:10.1017/S1380203807002176
- Ingold, T. (2011). *Being alive: Essays on movement, knowledge and description*. Oxford: Routledge.
- Ingold, T. (2013). *Making: Anthropology, archaeology, art and architecture*. Oxford: Routledge.
- Jones, C. R., Ferreday, D., & Hodgson, V. (2008). Networked learning a relational approach: weak and strong ties. *Journal of Computer Assisted Learning*, 24(2), 90–102. doi:10.1111/j.1365-2729.2007.00271.x
- Nicolajsen, H. & Ryberg, T. (in press). Creating a peer-driven learning network in higher education. Using WEB 2.0 tools to facilitate online dialogue and collaboration. In Carvalho, L. & Goodyear, P. (Eds.) *The architecture of productive learning networks*. New York, Routledge.
- Pinto, A. (2014) Design and functioning of a productive learning network. Proceedings of the 9th International Conference on Networked Learning 2014, Edited by: Bayne S, Jones C, de Laat M, Ryberg T & Sinclair C.
- Sørensen, E. (2009). *The materiality of learning: Technology and knowledge in educational practice*. Cambridge: Cambridge University Press.
- Wenger, E. (1999). *Communities of practice: Learning, meaning and identity*. Cambridge: Cambridge University Press.

## Acknowledgements

Pippa Yeoman and Lucila Carvalho are pleased to acknowledge the financial support of the Australian Research Council (Laureate Fellowship Grant FL100100203). They are also grateful for the support and intellectual contribution of the Laureate team and in particular, Peter Goodyear, Laureate Fellow and principal investigator of this research grant.