Actor Network Theory (ANT) is explored as a useful tool in researching the intersection of English teaching and Information Communication Technologies (ICTs), to understand the complex interaction of influences, both human and non-human, that combine to achieve a particular outcome, in this case the uptake of ICTs by English teachers in an Australian school. What this means is that alongside interviewing the teachers, administrators and technical support people, recognition is given to the influence of inanimate objects such as computers, bluestone walls and curriculum documents. This constructs a more complex picture of the change process accounting both for the invisible ideology of teacher beliefs as well as the technical capacity and incapacity of machines, buildings and policies. At the heart of ANT lies the metaphor of the heterogeneous network which is made up of diverse, not simply human, materials. Often these networks become consolidated as single point actors e.g. the English curriculum, the computer laboratory, the library, which are then seen as fixed entities rather than an amalgamation of parts prone to change. ANT allows for the constituent parts to be investigated, and following Bruno Latour’s *Aramis* (1996) this can be done creatively by literally giving voice to inanimate objects such as computers.

Why Actor Network Theory?

How do you interview a computer, a bluestone wall and a curriculum document? I haven’t managed it yet but I have found all of the above to be very significant to my research and more interestingly, I have found a way to give these inanimate objects a voice. That ‘way’ is Actor Network Theory (ANT) and what follows is a brief introduction to ANT and a more particular look at how I have found it useful both for my research conceptualisation and writing as I explored the intersection of English teachers and Information Communication Technologies (ICTs).

Actor Network Theory (ANT) may seem a strange choice of theory for a study of English and Technology in schools. This strangeness may be because ANT is not a widely known theory, or strange because it originated in the sciences and my research is in the humanities. Both these points of strangeness offer fertile possibilities especially due to ANT’s cross-disciplinary nature. ANT pioneers such as Michel Callon, (1986) Bruno Latour (1987, 1993, 1996, 1999, 1986), and John Law (1986, 1991, 1992, 1994, 1999) developed a new interpretive approach to studying the sociology of science and engineering by following scientists and engineers around in their daily work in order to study how they go about making scientific facts and artefacts. One of the greatest strengths of their work is their questioning of taken-for-granted assumptions and also their commitment to probing firmly held beliefs at both the conceptual and the particular levels. At the heart of actor network theory lies the metaphor of the heterogeneous network which *... is a way of suggesting that society, organizations, agents and machines are all effects generated in patterned networks of*
diverse (not simply human) materials (Law 1992, p.1). These networks can become consolidated and behave as single point actors – e.g. the laboratory, or the English curriculum – and are then seen as fixed entities rather than as an amalgamation of parts prone to change. Often we accept objects as unitary until they break down and we need to investigate their parts. ANT’s origins in the sociology of science and technology developed the argument that “knowledge” is a social product embodied in a variety of material forms rather than the product of a particular scientific method. For example, science knowledge may be composed of many networks within networks which may include test tubes, organisms, skilled hands, microscopes, scientists, articles, computer terminal etc. Pieces from the technical, the conceptual and the textual combine and convert into a knowledge product. In the same way, the thinking and writing expressed in this paper has been mediated through a range of human and non human materials beginning with the tools used for reading and writing – books, paper, pens, computers, printing etc. The question that can be asked when investigating any site (in my research it is English and ICT in schools), is how do the multiplicity of elements work together to produce particular outcomes? And it follows that change, by design or default, requires a reconfiguration of the constituent elements. In the early days of my research it soon became apparent that change was a key feature of the English/ICT intersection, and ANT has become a very useful theoretical tool to probe its underbelly.

Who is Writing this Paper and Why?

Before continuing this discussion of my research, I now position myself in relation to this paper and the stimulus that has driven my research. I do this deliberately in recognition of how this knowledge alters both the writing and the reading of this paper. I have been an English teacher in Victoria, Australia since 1994 and been intrigued by the galloping pace of the ICT presence in schools. In subject English, I noticed technological innovation most obviously in student work being word-processed, in the valiant attempts by publishers to interest me in ‘new’ electronic resources, and in curriculum authorities encouraging subject English to include ICT literacies. In reality I was too busy, too tired, too sceptical and too content with the already rich curriculum of subject English to pay much attention. Since leaving school teaching to become a fulltime doctoral student I have come to see just how complex are the issues surrounding the adoption of ICTs and how paying attention to the understanding and management of technological change can profoundly affect a whole range of factors across the school culture from morale, to economics, from student success to administrative organization. As I listened to stories of how staff worked with English and ICTs in my research school, (a large independent girls school I name Holy Cross) it became clear that the machines themselves, the walls that housed them and the curriculum documents that directed staff all played a powerful but largely invisible role in the uptake of ICTs. Why make such ‘things’ more visible? Because I believe that this knowledge can help to illuminate why there are difficulties in technological innovation and that knowledge may in turn suggest useful strategies that take a wide and proactive view. This paper seeks to shed a searching light on what lies beneath the taken for granted assumptions about English and ICTs, rather than offer ‘solutions’.

This brings me to one final, relevant disclosure, namely that this paper is my submission for a Travel Scholarship to the 2003 NZAARE conference. In Auckland, I hope to trade my stories as a novice researcher and actively enter the ‘bodied’ research network, which up until now has been a mostly disembodied, isolated experience with its own complex and necessary
network of actors which have contributed to my learning how to do research. Having this knowledge, you as reader are now also positioned to read differently in the network surrounding this text – whether you are a gatekeeper, a fellow novice, an experienced researcher, a publisher or a critic will influence your reading and indeed may cause you to stop right here. Having positioned myself in relation to this paper it seems appropriate to point out that this paper is itself the product of a complex network of actors including University resources and structures, the reading of many, many books and my resulting enactment of academic performance based on my immersion in the culture. What follows should and will bear the marks of a novice researcher and will reflect as much on myself, as on the state of the network which produced me as a researcher. This paper discusses ANT in relation to a small part of my own research and therefore gives a necessarily limited and partial view of the theory in action, particularly focussing on the selected actors relevant to my research. Furthermore I begin my discussion with a focus on the particular possibilities of writing in ANT and my attempt to play with its performativity possibilities. I have deliberately written for an audience for whom ANT may be new but I welcome the critical eye of ANT experts. To read on or not to read on, whether t’is better to scan or study, these are now your questions to answer.

Introducing the Actors and the Network

Given that many people find ANT strange at first glance it seems useful to begin with the most startling aspects of this theory and begin to undo the strangeness. That hoary old cliché of academic research – to make the familiar seem strange – is particularly apt to ANT when it asks of the research problem – not who are the participants and what are the factors, but rather – which actors contribute to this scene? This then is one of the strangest concepts of ANT - that the human and non-human actors in a research site are given equal footing. Neither is privileged over the other and while this initially flies in the face of what we feel we know about the world, it does offer a new way of looking at complexity and challenging the taken for granted status of human actors. The second part of this theory which reveals itself in the name ANT, is the notion of network. Put simply it refers to the interrelationship of all the actors, or how the ‘actors’ act on each other. To illustrate with an example from my research - if the curriculum documents say teachers must use ICTs in English classes but the bluestone walls of the classroom block the transmission signals so that the computers cannot connect to the intranet, it is fair to say that human and non-human actors are in a bind together and they need to find a solution which involves all of them.

ANT in practice brings to mind the computer imaging of human movement where a living person’s movements are plotted graphically by computer to reveal a skeleton of lines and dots moving mechanically, frame by frame through particular motions which can then be analysed and understood in new and particular ways. This has all manner of applications, from health to sport to gender differences to biology and is another useful way of making the familiar strange.

The Modesty of ANT

As soon as a researcher ‘enters’ a research project she becomes an actor herself. I had the further problem of being an insider researcher in that I was a practising English teacher at the
time and quite unfamiliar with ICTs in education; a combination which immediately
encouraged my allegiance to the English teachers at Holy Cross and pitted me against those I
interviewed from the technology faculty. In choosing to ‘play’ with actor network theory, I
have the opportunity to tell a different story than the one I was initially inclined toward, and
by looking at a symmetry of networked relations I choose to give equal consideration to all
my chosen actors and this helps to expose and counteract the insider bias I bring to the
research project.

John Law encourages anyone looking at the sociotechnical ordering of a research site to be
modest because they themselves are caught up in processes of ordering. We can’t observe
from a distance but are caught up in the reflexive and self-reflexive project of monitoring,
sense making and control. But since we participate in this project, we’re also and
necessarily, caught up in its uncertainty, its incompleteness, its plurality, a sense of
fragmentation (Law 1994, p.2). This offers me some comfort as I struggle through the maze
of possibilities and grapple with ideas but perhaps even more helpful is Law’s comment that
we are all social philosophers and that ...social and political theory is much too important to
be left to Very Important Philosophers (Law 1994, p.4). Like Law I want to tell stories about
the school in which the English classroom finds its ubiquitous place and through those stories
help myself and those who work there understand a little better how the very important local
social philosophies which we embody and perform, link to politics, morality and inequality.
Law claims that we are seekers of Order – we long to fulfil the modernists dream of properly
ordering our lives, organizations, theories etc. and then all will be well. But because the
world is complex, messy and heterogeneous, research will reflect this and any claim for
perfection is an illusion. Interestingly, Sherry Turkle’s (1984, 1995) study of computer arcade
games revealed how men (mostly) sought an escape from the complexity of the world in the
artificial and controllable world of the computer where an elaborate infrastructure effectively
conceals complexity and allows the artificial world to comply with its own designed order.
This has very interesting implications for the use of technology in education, especially the
claims that are made for its capacity to solve intractable problems. ‘Spellcheck’ is an example
of the seemingly simple solution which cannot support the complexity of what spelling in the
written language demands. Technology has held out this illusory hope of controlled order to
educators – the question is why have so many believed its promise enough to invest so
heavily in it? Is it as Law suggests, that we long for purity, perfection, an end to
complications and wish for something to fix all our educational ills? Following Law’s advice
I will tell my stories of this educational network but I offer it alongside other possible stories
and recognise that my stories are partial and should not be taken too seriously nor be puffed
up with hegemonic pretension (Law 1994, p.14). Stories can tell of effects that are generated
in seemingly stable ways and how divisions that look like dualisms came to be seen that way.

Like others who have used ANT (Jensen 2001, Nespor 1994) I have also patched together a
selection of borrowings from several theories and I fully acknowledge that there will be gaps
and inconsistencies, however, the working through of an idea, even if it finally needs to be
discarded is valuable work and helps move the study and practice of education forward. This
is not a neatly sewn up watertight presentation of a forgone conclusion. I have tried to
identify the direction of the grain and deliberately tried to work against it, and that is why
ANT is a tool I considered worth applying to my research problem.
The Playfulness of Writing ANT

To begin my research exploration I posed a double-sided question: *What do English teachers make of ICTs and what do ICTs make of English teachers?* and found that the latter part of that question lead me straight into ANT territory. I noticed in beginning the research that ICTs and many other inanimate objects do have a powerful influence on people’s understanding and behaviour but I could only ever account for it from their own perspectives. Bruno Latour’s *Aramis* (1996) shows a way to explore the influence of both human and non human factors, in his sociological writing which allows (here comes a piece of strangeness) for a train design named *Aramis* to speak of its disappointment in the engineers for giving up on a technical problem, which failure contributed to the demise of the *Aramis* transport project.

*I am not yet among the powers that be. I am only a light breath, a feather drifting with the winds, a murmur in an engineer’s ear, a wasp to be flicked impatiently away, an attractive idea that flits from seminar to colloquium to investigatory body to research report…My story is told in words and drawings; it is not yet seen in hard type…Chase away the people and I return to an inert state. Bring back the people and I am aroused again, but my life belongs to the engineers who are pushing me, pulling me, repairing me, deciding about me, cursing me, steering me (Latour 1996, p.123).*

This is certainly an unusual take on research and research writing, and yet this novel way of understanding a problem does offer a fresh view of the complexity of a problem and forces us to think in new ways. Much research on technology in education has focussed on counting – and invariably research reports total the columns of numbers, draw some conclusions, both useful and obvious and end with the coda - *more research needs to be done*. While it is a given that more research needs to be done – can the research experience itself offer valuable insights into the journey of understanding? In this study it seems valuable to not focus on the end result but to explore as thoroughly as possible the process of finding out what factors are at play. The word play itself is one I would like to consider as helpful in this study because it encapsulates other than conventional modes of serious study. The image of a child engrossed in play which captivates her full attention and takes her into a world of her own is a powerful example of attention to the task at hand. Research can very easily become focused on the end product and not be attentively involved in the actual research experience. When the phrase - *there are many factors at play here*… is used, there is a delicious irony that the metaphor of play can incorporate the mischievousness associated with play. The corruption of a serious task that has been hijacked to playful ends can sometimes achieve more than the formal, conventional, serious, original intent of the exercise.

This research project takes on just a touch of the playful by nudging academic conventions, to make room for other possibilities, and to challenge the hegemonies of accepted thinking, writing and presentation. Some readers are immediately wary (and often rightly so) of the personal, creative and aesthetic forms that research can take. ANT challenges this binary and can offer possibilities to push the metaphor of play a little further and very seriously. *Aramis* blends many genres – interviews, dialogue, reports, monologue, anecdote, story… to tell the research story but also to examine the production techniques by which the story is produced. The fact that ANT is conscious of the taken-for-granted nature of writing makes it even more relevant and appealing to myself as an English teacher-cum-researcher. One powerful form
of knowing which English teachers work with goes by the name of drama. As play is a staple in the English teacher’s stable, one reason for pursuing not only the ideas of ANT but its expressive possibilities, is that English teachers have both the interpretive skills to understand and the interest to read evocative research. After all it is the very practitioners of English teaching in whose interest and support this research was undertaken, but the gatekeepers of academia have traditionally traded in a different and exclusive sort of script which does not easily cross the border between the two territories.

This border-crossing communication is taken up by others such as geographer Derek Gregory who calls for the exercise and development of a geographical imagination: *for if we cannot evoke landscapes, if we cannot provide descriptions of the relations between people and places, so vivid that they move our emotions*, (Gregory and Walford 1989, p.88), then (adapting Geertz) our geographies are radically thin. He offers an excerpt from Pierce Lewis’s Presidential Address to the American Association of Geographers as an example and questions whether it is geography or fiction and whether there is a clear distinction between the two, on what basis and why.

> My love affair with those Michigan dunes…had everything to do with violent immediate sensations: the smell of October wind sweeping in from Lake Michigan, sun-hot sand that turned deliciously cool when your foot sank in, the sharp sting of sand blown hard against bare legs, the pale blur of sand pluming off the dune crest against a porcelain blue sky…As I try to shape words to evoke my feelings about that far off place and time, I know why the Impressionists painted landscapes as they did, not literally, but as fragments of colour, splashes of pigment, bits of shattered prismatic light (Gregory and Walford 1989, p.88).


> In this book I sometimes choose to break the narrative up and tell different and somewhat incompatible stories. I know from experience that this can be irritating for the reader: it may look narcissistic, exclusive or indecisive. As Rorty indicates (1989:30), it can also be humiliating. So I do it here uncertainly…Perhaps it is a matter of offering conjectures and then seeking to explore their limits, rather than concealing the places where they appear to be going wrong. Or perhaps it is…that the places where the cracks are most visible are the growing places in research. (Law 1994, p.189).

Law recognises that there are many voices in his study and many voices in social theory and that he cannot Godlike reconcile them all. He also acknowledges his privileged position in a
university and the limitations that privilege has in understanding the problems of others who
are in less privileged places. Interestingly he adds a postscript where he invited colleagues to
respond to his writing and notes that most of all there was comment and disagreement about
the self-referring nature of the book, ranging from appreciation, uncertainty to intense dislike.
Law’s own experience of reading self-reflexive texts includes their potential to be cute,
extremely irritating and strangely self contained, and sealed off from criticism and comment.
This may well be in part, a reflection of the discomfort of establishing new ways of
thinking/writing as well as new ways of reading/thinking. Acknowledging that he writes with
risk from a position of security and privilege, he accepts the criticism that others who may
wish to write with uncertainty in unconventional ways face devastating effects in breaking
with the accepted conventions of academic writing, if they do not have an elite, high status
position to start with.

The writing you are now reading is risk-taking in relation to the scholarship gate keeper, but
as a researcher and writer I am troubled by a greater question – how do I take these
understandings back to the people who allowed me into their workplace and explain to them
that all I found is incredible complexity and endless networks? How do I find my way back to
the starting point and offer something intelligible and useful to the working lives of those
involved and beyond? This is where another academic apparatus swings into action – under
the guise of findings. Law faced a similar problem which was encapsulated in one manager’s
comment on his research findings: I’m not very clear what the conclusion is. What the bottom
line is. It would be nice if this was clear for the general reader. Law’s response was: The
bottom line is that there is no bottom line...like juggling...you have to keep on moving. (Law
1994, p. 189). Writing is a choice to force some sort of order on the chosen topic and readers
will look for the bottom line because they feel a need for it and the simple conclusions that
provide a sense of closure. All research is an attempt to call a wide range of fragments into a
provisional order so that in the first place the terms of the research can be satisfied, and in the
second place the researcher and co researchers achieve something that has integrity and
harvests the investment of academic energy in the form of deepened and worthwhile
understandings.

Perhaps ANT is not so playful at all yet I can see fresh possibilities in the use of its ‘actors’. I
have adapted its ideas to make a link with the established practices of English teaching and
plan to ‘literally’ turn my participants, human and non-human into actors by allowing their
dialogue to speak in a play. It must be made clear that just as a theatrical play takes place in a
constructed world, this research project is highly crafted and channelled through the mind of
one particular researcher, but its intent is to represent in a challenging and compelling way,
the drama of the ordinary and the taken for granted. My research uses the power of the actor
to hear the voices of the research participants in a crafted context that highlights particular
issues. So just as a stage is set with props and lit for effect, with directions to the actors for
movement, volume and mood, so this research uses the wide sources of data to craft an
observation which in turn is presented for the reflection of the audience. I embarked on its
use with a sense of risk and daring, and the hope that whatever the limitations (and they are
there) the trialling of an idea from a different discipline might offer new insights into a
problem that it has been difficult to see from fresh perspectives.

Clarke (Clarke 2001) values actor network theory for the kinds of stories it allows us to
construct about the world and forces us to recognise that some actors in a network will have
established themselves more powerfully and that there are reasons for this which we can
explore if we ask how those actors were able to overcome resistance. Problems make good stories and ANT seems to have its share of failure stories where the network of actors is supposed to be mobilised into a manageable entity, but fails to emerge. This research report has been crafted for presentation and invariably this will include the tidying up of loose ends so that the ideas will seem self evident and natural. However the reality is that research is one bumbling step at a time, many in the wrong direction. Successfully translated entities, like research, are the tidy, easily packed luggage which causes no problems in transport. The contested entities are far more difficult and threaten to spill their contents in all the wrong places. Latour’s *Aramis* (Latour 1996) is high drama but it was the researcher who chose to tell the story in a multivocal form with selections from the available evidence. It could have been told otherwise.

**Some Actors in Action**

Having worked with the idea of actor networks for long enough now to be comfortable with it, I realise in retrospect that I first encountered the idea in my readings around technology and society and I felt almost swallowed up into a rather frightening world of those longing to be disembodied and live a cyber existence. Donna Haraway (Haraway 1991) was the turning point to bring me back from the somewhat lunatic fringe with her proposal that cyborgs are a part of life and that the distinction between human and machine is sometimes very unclear. The more you work with the idea of symmetry in networks, i.e. giving all actors equal attention and not privileging human actors, the more you begin to see that the interaction between human and non human is all pervasive and profoundly influences networks. This is not nearly so clearly visible when humans are accorded the status of the powerful. What follows is a brief discussion of each of seven selected actors which I have found to be important in their influence on the research topic – *English Teachers and Technology*.

**Geographical Space as Actor**

I begin with the very concrete but strangely invisible world of the spatial. Like Nespor (Nespor 1994, p. 28) my interest in spatial issues grew out of a similar problem in my fieldwork – the need to find a location for interviews. If my focus had been solely on the words of those interviews I could have missed or ignored the sense of place that I was exposed to as I followed my participants along creaking corridors, up rickety stairs, through courtyards and into hovel like rooms or cavernous halls. I was left with the feeling that I would surely get lost if I had to find my way alone, and it struck me that while the staff had mastered the nooks and crannies of the physical space of the school – its idiosyncrasies must continue to exert an influence on their work patterns, their mood, their behaviour and their relationships. When comparing studies of different schools physical differences and how they affect people’s behaviour are often overlooked. Nespor’s research led him to notice and compare the physics and business faculties of the same university. The isolated, austere, tightly disciplined and cramped accommodation of physics students was in stark contrast to the plush reproduction of corporate space provided for the business students to facilitate business demeanour, dress and public sociability. Nespor realised that the very organization of space served powerful but largely unacknowledged purposes. In my study also, I was drawn through my fieldwork to ask what difference does working in this particular place make, and that generated a comparison with the physicality of my own teaching spaces.
Today when I arrived for my interview at the school I was led on a circuitous tour of the school looking for a suitable, or at least available, room. It made me realise that every interview I had done so far was in a different place and had a very different qualities. The school was established in 1860, and I’m conducting this research in 2002, so its buildings range greatly in style and my interviews have taken place in greatly varying architecture, from monastic like turrets to rooms designed with an modern aesthetic and practical eye for space and light. It did make me wonder how the architecture might influence the research conversations and that in turn led me to wonder how teaching practice might be affected by the space in which people work. By this I mean both the physical aspects such as dimensions, colour, smell, light, heat, furnishings, but also how all the many disparate factors might add up to a mood or ambience or expectation that activated particular responses, unconsciously I suspect. (Research Journal, April 2002)

The one thing common to all the rooms in which I interviewed, was the public address system. It was inescapable. ‘They’ had ‘us’ covered. I was in the school at many different times of the day and invariably my tape recorder collected some of the daily messages emanating from the office through the loudspeaker. The people had been networked long before the computers. In interviews I was told about the number of networked computers available in the school. I was also told about the wireless network which had been set up in several rooms. Staff told me about the difficulties of them accessing the network because of the impregnability of the bluestone blocks which made up the walls of the older parts of the school. English teachers took great delight in demonstrating how they had to hold up their laptops and angle them experimentally in a grotesque kind of dance to make contact with the signal. Physically the architecture added a complication to the practice of networking.

This observation about the physical environs prompted me to ask for a tour of the school and I was directed to a Sister of senior years who was one of the longest serving teachers at the school and who had written a history. Touring the school grounds after hours was a very revealing and somewhat eerie without the life that students and staff bring to such a large institution. There were the usual stories of development and expansion, foundation stones for building projects, the disputes with councils and the expectations of stakeholders. But the very issue of networking that took me on this journey was poignantly captured in a framed chart on the wall of a most elegant and beautiful corridor of stained glass, wood panels and exquisite tiling. A seemingly insignificant document hangs near the foot of a beautiful staircase where the rich dark wood of the banister meets the exquisitely tiled floor and it frames a list of names and beside each name is a series of symbols indicating a code for that person. This was perhaps the earliest form of networking and preceded the intercom which so efficiently impressed itself on my tape recordings. When the telephone first established its singular presence in the school, there was soon a need for a simple way of summoning the appropriate person. As there were many sisters who lived on site and the school had grown beyond calling distance, a system of bell rings was designed to alert people to their own particular calls. In time the telephone system became networked with lines installed in appropriate places around the school. So the very notion of networking for communication and convenience had been put into practice many years earlier and was needed because of the design and size of the school buildings and the numbers of people working within its confines. The same is true of the networking that that the school has established for their
ICT’s, however the pace of the change is significantly faster, with the layout of computer classrooms being designed first for the wires of cabling, but soon being modified for the radio network which tellingly is called wireless.

By tracking back the history of the rooms in which I interviewed, I was able to tap into the way the physical attributes of the school had influenced behaviour and communication. The very walls of the place were actors in a network of education. In a similar way, every time I spoke to a person I tried to envisage the foundations on which their current practice and thinking was built. This was far more invisible than the bricks and mortar surrounding our interviews, but perhaps far more powerful and certainly more taken for granted.

Geographer, Derek Gregory (1994) has explored the importance of spatiality to human relations and values the urgent questions that postmodernism raises about place, space and landscape in the production of social life. He describes Leys’ (1987) essay on the politic-cultural landscapes contrasting two redevelopment projects of inner Vancouver:

> The north shore is a monument to modern technology, to the internationalisation of ‘rational’ planning and corporate engineering while the south is a post-modern landscape attentive to the needs of people rather than the demands of machines and (above all) sensitive to the specificities of particular places (Gregory and Walford 1989, p. 68).

Gregory uses this as an example that rather than postmodernism being a traditionalists dream to recover a lost world, it is a movement beyond the modern and an invitation to construct our own human geographies. This telling description of a cityscape and the philosophical interpretation of its influence on people’s lives is a powerful way of looking at schools and the transformations they are undergoing to reinvent themselves in relation to new technologies and new ideas about education. What we claim can be counterclaimed by the environments we build around us. Apart from the school leadership, all other interviewed staff did not have a space to call their own and were sensitive both to what others might make of the research conversation and also of intruding upon their precious non teaching time. Space and time were very influential actors in the construction of the interviews which were usually bounded by the bell and new occupants arriving to use the interview room.

**Criticisms of ANT**

Given the modest stance ANT adopts towards itself it is open to useful criticism and the following valid issues have been raised. Miettinen (1999) identifies three problems with actor network theory, namely how to choose which actors to look at when analysing networks, and choose you must because the possible actors are endless. Furthermore, what is the effect of neglecting marginal or silent actors and does the principle of generalised symmetry break down if human intentionality and cognition is acknowledged, making human actors unequal with non human?

Donna Haraway’s (1992) major criticism levelled against ANT, is that it neglects the major issues of gender inequality, imperialism and class structures. This will not be a major focus of my study but I would expect that to find be traces of the current societal power structures evidenced in some of the actors and networks. Nespor acknowledges that *it would be a mistake to emphasise the fluidity of the world without noticing that it flows at times in very
deeply worn channels. (Nespor 1994, p.15) In education the worn channels, such as literacy, assessment, control… are particularly difficult to see clearly from outside the network.

The world at the time in which I write has witnessed major national and international breakdowns in institutions, governments and businesses, all of which have been followed by intense speculation and soul searching to determine why. Law likens the surprising collapse of organizations, governments or systems to the springing open of hidden trapdoors of the social which leaves the sure knowledge that the masters of the universe may also have feet of clay (Law 1992, p. 1). To transfer this idea to the research of English teaching and technology is to ask (before the trapdoor springs open) how subject English came to assume its powerful and largely uncontested place in the education system and how technology has come to school and increasingly occupies a prime portion of the budget, the curriculum and the infrastructure and is favoured of the government, industry and community but not necessarily of those who work in our schools? Laws argues that it is important to apply the same sociological scrutiny to the powerful and the wretched alike, and to question the assumptions that may lie unnoticed in our very questions. So if English is powerful and technology is desirable to education, why do we believe this is so and what conditions enabled the establishment of these perspectives and allowed them to flourish in the very fabric of our education system.

A further question which is crucial to this research project is, how do the particular sets of networks operate to overcome or silence resistance. When looking at technology in schools it is very easy to sniff out resistance but why is it no match for the onslaught of ICTs and what happens to this resistance if it is not accounted for? Does it go underground, become subversive, does it corrupt the seeming primacy of technology over all else in education? These are powerful questions to ask in the light of the great hope originally placed in technology and the counter claims of the researchers who set out to test the reality of those claims, and who increasingly speak of the bubble having burst.

One of the necessary investigations of ANT is to dismantle the apparent single entity of a concept such as technology or ICTs and force it to bare the complexity of its constituent parts. So a computer in English teaching comes to be seen as a particular lesson with ideas and words and concepts and humour and actions and texts. It is very easy for a powerful technology such as a computer to be seen as simply the best feature. This mistake when unmasked has revealed to schools that teacher understanding, skills and training is often missing, as is software, infrastructure and architecture. But in the glamour of all things ‘amazing’, critics are easily dismissed as being churlish, not caring for the student’s future opportunities and regressive/fearful. It is precisely because there is a lot at stake, children’s educations, teachers’ professions, schools’ financial resources and governments’ investments, that research such as this needs to go beyond the playful, the experimental, the trite, the face-saving, the prestigious or the purely academic. Those actors in the network who are powerful now, need not necessarily be so, and research can show ways to disrupt unequal relations. Star says every one of the many communities or social worlds which we inhabit generates its own metaphors and power is about whose metaphor brings worlds together and holds them there. (Star 1991, p.52)

Conclusion
Brunner (1994) states:

If culture is capable of being remade, if it is indeed social practice, then who the actors are is an important question… What has to be questioned in any notion of agency, however, is the structure within which knowledge is produced; put another way, we need to question the effects of power within particular discursive practices that tend to produce ‘regimes of truth’ or the powerful arrangements that mendicate what is counted and who decides…..

For each of us operates out of a history and a world view and each of us views schooling accordingly, but it may be the extent to which we consider ourselves capable of positioning, capable of dislocating boundaries, and capable of negotiating meaning in any given situation that may define our roles as teachers and learners….Thus I invite readers to think about particular ways in which our beliefs about teaching, in general, and about teacher education, specifically, can limit our possibilities for practice unless we ask harder questions that may seem to stand logic on its head. (Brunner 1994, p.54-5)

ANT is one tool which helps us to ask those questions that seem to stand logic on its head.
References


Banks, Stephen P. and Banks, Anna 1998, *Fiction and social research: by ice or fire*, AltaMira Press, Walnut Creek CA.


Davies, Bronwyn 2000, *(In)scribing body/landscape relations*, AltaMira Press, Walnut Creek, CA.


Ellis, Carolyn and Bochnier, Arthur P. 1996, *Composing ethnography: alternative forms of qualitative writing*, AltaMira Press, Walnut Creek, Calif.


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