

TECHNICAL AND VOCATIONAL LEARNING: CRAFTING TOOLBOXES FROM METAL AND CLAY

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This paper looks at learning that occurs in a ceramics studio and a machine workshop as specifically technical and vocational learning spaces. Drawing on qualitative data (in-depth interviews) from two TAFE students, this paper explores the ways technical and vocational learning contributes to the development of the self. The students discussed, deployed learning in TAFE as a strategy to differently position themselves in employment and in the world more generally.

With an understanding of society as fluid, rather than as a fixed structure, people today are now required to live with uncertainty as never before. No longer do people train for or expect a 'job for life' nor is one set of skills sufficient. The skills needed to gain a position or move between different positions in a society, which has itself become more fluid, requires individuals to continually learn for life. These two case studies of a ceramics and metal work student provide an example of learning for life associated with craft, occurring in spaces that can enable people to (re)make themselves and to inhabit, on different footings, a world that is uncertain.

Introduction

The throwing of clay in a ceramics studio or the grinding and shaping of metal in a machine workshop involves the learning and practice of craft skills in specific spaces. Such learning is more often than not associated with previous times of pre-industrial and industrial employment. Shaping clay forms and metal manufacturing is the learning of craft skills that enables the development of abilities and techniques that are not immediately or explicitly recognised as 'useful' beyond their functional contexts. The learning spaces where the practical and manual development of craft skills occurs provides for a learning that differently positions the learner beyond their immediate identity of classroom student or trade apprentice. In the studio and in the machine workshop students become makers and producers, crafting lives for them self, through learning experiences that yield dispositions beyond the immediate utility of these skills for industry requirements. These learning spaces inhabited by students are technical learning spaces that involve the making and production of workable selves.

'Workable selves' are developed through a technical and vocational learning that provides resources, especially space, for individuals to learn about the world and themselves. Historically technical and vocational learning has been a learning that is shaped through the contours of industry and labor market patterns, skills and capabilities, and the refinement and improvement of those myriad of technical, vocational and further education traditions. It has been understood as a manual education and training and therefore 'blue collar', working class, trade education and not higher education or professional learning. Technical and vocational education in Australian education systems has historically been located in secondary schools and TAFE Institutes. What constitutes a technical learning and education has in Australian education become problematised, where in, post industrial arrangements have meant that supply chain processes have been restructured through recent business processes such as outsourcing, off shoring, privatisation, new technologies and globalisation thus redefining skill and skill requirements and destabilising understandings and conceptions of technical education.

While TAFE's origins lie in the combined institutionalised practices associated with technical and craft education, and general and adult education, conceptualising technical education in an information age is difficult. This paper will not define or build a pedagogic boundary around what does or does not constitute technical learning in the 'information age'. Rather this paper by

focusing on 'space' as a critical idiom will analyze the educational practices of technical education as it relates to subjectivities. Activity in places like a ceramics studio and a machine workshop, point to the traditions of trade and craft education that have been historically connected to technical, manual training. Space, both figuratively and physically, underlines the meanings and value of technical education in a continually changing educational environment by students, industry and communities. The history and traditions of technical education have an enduring legacy in TAFE that continues today. The persistence of technical learning through activities such as trade training and craft learning, in some ways, points to the wider remit of technical education. I want to use a notion of 'space to explore how the technical and vocation learning spaces of the machine workshop for Frank, and the ceramics studio for Louise, provides for a learning of techniques useful to them as individuals as subjective resources in themselves and as not just being contained to an understanding of technical learning as the acquisition of the external skills of clay and metal craft.

Space in education and learning

Aristotle expressed the practical over the theoretical over 2,000 years ago, when he wrote that absorbing knowledge is not enough. If you are going to use it, knowledge must be worked into the living texture of the mind' through practice and application." (Wolf: 2002, p.160)

Working knowledge 'into the living texture of the mind' in a technical education context, necessarily involves activities of assembling and making practices. Louise and Franks learning in TAFE reveals a particular 'doing of education' in technical and vocational educational spaces. The space they inhabit as a ceramics students and a fitting and turning (engineering) student differ from other vocational education and training students by virtue of the fact that they are immediately involved in the transformation and manipulation of the raw resources of metal and clay. Along with these craft skills their learning is further connected to assembling the self through learning the craft of making a life. Developing individual pathways in learning and creating a (work) life are distinctive traits of these two students experience of technical and vocational education.

Technical education as a separate and segregated educational space in Australian Education systems was dismantled in the second half of last century. Today technical education is being rethought and redefined through policy initiatives that seek to redress skills shortages. The transformation of tertiary technology institutes into universities and the creation of comprehensive secondary schooling throughout Australia saw technical education subsumed under the rubric of vocational education and training. The apparent policy renaissance for technical education today, while conflating technical education with trade skills development, provides an impetus for exploring what technical education spaces look like and what they offer. If we take it that,

Space is subordinated to time in both the theory and practice of education (Paechter, C. 2004, p.449)."

it seems timely to explore some of the remaining traces of technical education spaces that persist from a bygone era of technical education in the broad array of vocational education and training provision.

The concept of 'space' in education is more often than not used in terms of physical location and as a metaphor for distinguishing between, learning areas (disciplinary and field), and/or learning levels (primary, secondary, tertiary, or lower, middle and higher education). It has been argued that the processes and practices understood through theories and research into globalisation have provided a situation that highlights the

issues of space, particularly in education (Edwards & Usher:2000). Cyberspace and the transformation of space by new technologies illuminate the importance of space in thinking about contemporary society and how education occurs. In education spatial metaphors of open learning, distance education, international education, global education abound.

Edwards & Usher believe that,

“Globalisation brings to the fore questions of space, place and identity and indeed, some would argue, is a condition for their emergence as problematic (Edwards & Usher,2000,p9).”

The problematic of the space of technical education in Australia today is that it has to be rethought in terms of what kind of technical education can be provided that is useful to the post-industrial, knowledge economy ? And to consider how technical education can best prepare students who inhabit a globalised world. So asking, how does a technical learning enable or develop student’s capacities for sustained social participation?

Education inquiry that uses a concept of space involves the discursive engagement with ‘structural space’. That is, the exploration of learning practices and activities, the policy architecture and cultural politics that give rise to specific education practices and pedagogic modes. Within this discourse, institutional arrangements and even the buildings, signify the value and purposes of specific learning practices. Technical and vocational education and training has been shaped by prevailing local industry arrangements and needs. The very history of technical education in Australia can be traced back (geographically) to the Schools of Mines established in Ballarat and Bendigo in Victoria during the gold rushes. According to Paechter (2004),

“Metaphors of structural space thus have a very strong sense of learning being built up from strong foundations, each new element resting firmly on the one below.”

In an era of globalised markets and international education, technical education has been largely misconstrued as a specific and narrow educational space. Vocational education as a sector and congregate set of education practices and activities is defined and understood through employment patterns and occupational categories. By overfocusing on employment patterns and existing occupation categories, specific skills and craft traditions becomes subjected to labor market patterns and categories that cohere with immediate business and industry needs, returns and profits.

As stated by Mulcahy (2008) space and spatiality is increasingly being taken up by education researchers to explore relationally, the connections between curriculum, pedagogy and identity.

“Spatiality is primarily to be seen not in terms of a backdrop against which action takes place but rather in terms of activity or practice. ‘Space’ is done: constituted through action, for example, acts of occupancy or appropriation.” (Mulcahy: 2008,p58)

The actions, activities and practices that constitute technical education in Australia have a long though somewhat vulnerable history. The history of technical education in Australia dates back to late nineteenth century when intuitions such as ‘Mechanics Institutes’, School of Mines, Working men’s colleges, Women’s domestic schools and other commercial learning colleges were established to provide certain types education of learning to certain sorts of people. The space of technical education has ebbed and flowed

in accord with changing industry practices and has further been reshaped by changes in education policy.

Technical & vocational education

The two students whose learning experiences will be used throughout the rest of this paper to explore technical learning spaces had previously participated in research into the characteristics and features of contemporary TAFE learning. Frank completed a fitting and turning apprenticeship along with a Diploma in Engineering at TAFE while Louise's TAFE learning involved the completion of a Diploma in Ceramics. Frank attended a secondary technical school while Louise undertook her secondary schooling at a suburban high school. Technical education in Australia has a history of operating in the secondary and post secondary sectors (TAFE and University, Technology Universities). The focus of the previous research where Frank and Louise's data was collected was on TAFE learning and lifelong education. That research focused on TAFE learning as a strategy deployed to build and forge a 'workable life'. By looking at 'space' this paper illuminates how Frank and Louise inhabit a 'technical' or craft learning space and to explore its connection to their sense of self.

Frank and Louise's experiences of TAFE learning though differed from the other participants in the previous research project as their experiences were explicitly technical in its connection to the history and tradition of trade and craft learning. The other four TAFE participants from the previous research (Pardy, 2006), while engaged in vocational and workplace learning, did not learn in dedicated spaces that involved the use of raw materials and machinery. The spaces of the ceramics studio and the machine workshop in Frank and Louise's TAFE learning involved the development of techniques and abilities through the arts and disciplines of specific forms of technical education.

The interviews with Frank and Louise's lend themselves to being reworked in order to consider both the role of space in understanding and thinking about education and to explore the practice and activities associated with technical education in the contexts of the metal and clay crafts. Their interviews reveal insights into the technical education foundations of TAFE learning. The importance of 'space' for thinking about education and in doing education research is often overlooked. This paper will show how space is indispensable for understanding technical learning in a contemporary context.

Technical learning in Australia today is not school and its not university, it has a history of being a 'part of' secondary schooling that even defined technical education for a large proportion of the twentieth century. It certainly isn't university, but did have a place in Technology Institutes or Technology Universities. Technical education for want of a better term is connected to learning and knowing a craft. Kemmis (2005) believes,

"Craft knowledge involves understanding *doing*; it is dynamic. It refers to sequences of action that take place in idiosyncratic forms in relation to particular materials, technologies, circumstances, and the particular intentions of the craftsperson and others relevant to the particular act of *making* involved in a particular case (for example, making a pot, making a poem, making someone healthy again) (Kemmis: 2005, p.403)"

Technical education is about 'knowing how to practice', hand building a pot, or practicing your 'speeds and feeds' in metal crafts. Technical education is a sort of 'knowing in action'. This stands in contradistinction to the theorisation of practice. Professional craft knowledge or knowing how to do something is the continuum upon which the depth and fine detail of technical knowledge is constructed.

“The craft knowledge of the practitioner is located not only ‘in the head’ of the practitioner, but also in conditions of possibility shaped in and by social, discursive, moral, historical biographical and institutional orders. (Kemmis: 2005, p.403)”

Technical education and craft learning then is about the deliberate making of things through thinking, reflecting, doing and deliberating.

The historical context wherein craft skill or trade skills significantly influenced and shaped the labor and production processes in factories and manufacturing and production plants has passed. (Sayce, Ackers & Greene: 2007, p. 87) Industry restructuring in Australia from the early 1990’s changed the shape of skilled trades in workplaces wherein work reorganisation has seen the emergence of managerialist control of labor and production processes as more predominant.

“Knowledgeable practitioners do not rely on knowledge internal to a craft alone, or to knowledge codified in the traditions of their particular field of practice; they also rely on their capacity to ‘read’ situations in the light of what has happened in other situations. (Kemmis: 2005, p.405)”

Today craft ability and technical know how has been refigured in the ‘self’. Like employability more generally, craft ability is understood in today’s labour market as a skilled disposition attached to and formed by an individual subjectivity.

Making Spaces making selves

Frank’s fitting and turning apprenticeship commenced when he left technical school at the end of Form Four (Year 10) and involved the combination of working for a company and spending a day a week at TAFE. This transition to employment has become much less common today for an array of socio-structural and economic reasons. Where in the past, firms and publicly owned enterprises routinely recruited large numbers of apprentices on an annual basis, today apprenticeships occur on a more individualist basis. Industry restructuring, out-sourcing, contracting arrangements and privatization have changed the patterns of engagement for today’s apprentices. Nonetheless the training of apprentices continues to combine employment based learning with institutional based learning that will usually occur in a TAFE Institute and will include technical education especially in the timber, metal, and construction and engineering trades. Apprenticeship education involves elements and aspects of technical education along with broader employment related learning.

The learning of craft skills such as ceramics is carried out within the fine arts areas or in design areas of technical and vocational learning organisations. The last twenty years of VET reform have emphasised a utilitarian and instrumentalist view of technical and vocational skilling, so much so that, skill development opportunities in areas that are not immediately recognised as relevant to industry’s current needs are not a priority and are more often than not marginalised as important areas or forms of learning. Programs such as ceramics at worst, are reduced to hobby or personal interest courses and not recognised as relevant in discourses of human capital development.

Louise and Franks TAFE Learning inheres with the traditions, however sketchy and diffuse of technical education. Both Frank and Louise deploy TAFE learning as a strategy to orientate themselves in an increasingly complicated world. Louise, in relocating from

rural Victoria to the city, believed study would provide her with a neat way to structure her time and orientate her to the city. Louise commenced a Diploma in Fine Art (Ceramics) and completed it to become a practicing artist and writer. Frank left school in year ten after securing an apprenticeship in fitting and turning. At the end of his apprenticeship Frank obtained a Certificate III in Fitting and Turning along with a Diploma in Manufacturing Engineering. Eventually Frank returned to study to complete a liberal arts diploma and then a degree in politics and sociology. Finding a place and seeking out a direction is the motif in Franks and Louise's foray into TAFE learning and their experience of a certain type of technical education has biographical significance.

Upon first entering trade school Frank described the site of his trade school as an all encompassing space.

“it was a big school when I was there. RMIT in the city. And it just seemed to have a huge history as well, more so than the early tech. Yeah, it was just big; the school covered not just one block but lots of separate blocks; all around”.

(Frank)

The Trade School is conceived as being huge both historically and physically signaling the 'larger world' beyond school. For Frank getting an apprenticeship was about widening his horizons in the worlds of work and through tertiary learning organisations. The way Frank goes about explaining the spatialisation of the how the learning occurs at 'trade school' is replete with rules that connect with the workplace and that seek to establish how students behave and operate in the college.

“It was in a working environment, if you came late, you'd get docked; that kind of stuff. They were very strict. They took no nonsense, absolutely no nonsense. For instance, if you didn't want to learn, they'd just tell you to leave. And they'd get in touch with your employer, who would then take action – disciplinary action.”

(Frank)

Frank describes a 'strict' regimented 'lock step' approach to his trade learning at TAFE connected to workplace performance. Through his apprenticeship, Frank developed tool making and machining skills that provided him more work choice on the shop floor in the factory where he was employed. Learning enabled Frank to be positioned in his workplace as well as providing him with the knowledge to navigate his work environment.

“the apprentices always seemed to get the better positions in the factory. One of the general managers was an apprentice, so the road we were lead to believe was open.”

(Frank)

Frank's description of trade school being like a workplace points to the style and manner in which such students inhabit the learning spaces connected with apprenticeship learning.

In describing his trade training Frank illuminates the spatialisation of the learning at trade school. This spatialisation repeats a hierarchical ordering of ways of knowing and modes of learning.

“in the mornings (we'd start at 8.00 o'clock) we used to be in the upper levels doing theory, and then in the afternoons we'd go downstairs (into the basement) where all the machinery used to be – under the foundations – and we'd spend the rest of the afternoon there.”

(Frank)

Upstairs involved theoretical study in engineering drawings, minerals and heat treatment processes, mechanical indicators, and trigonometry. Down in the basement the machines amongst the 'foundations' was where the apprentices developed skills in working with vertical spindling machines, optical projectors, and surface grinding machines, external and internal grinding machines and linear measuring instruments and standards. Developing the capacities to operate and drive these machines along with understanding the operating principles and knowledge that 'engineered' them was the content of Frank's technical learning. Working on and operating the machines was carried out at both the TAFE and in the 'workplace' for the purposes of metals fabrication. Frank's apprenticeship learning involved the development of 'know how' together with an insight and understanding of the 'know why'. The technical learning of fitting and machining combines both the practice and understanding of different metal crafting processes.

Frank provided an extensive list of the content of his trade learning and it is worth repeating here to show the breadth and depth of his trade learning. A learning that is technical and conceptual in an applied sense by virtue of the fact that at work Frank like all other apprentices put into practice what he learnt at trade school and developed considered understandings of his employment practices whilst at trade school.

“The trade school stuff, we went through: engineering drawings, minerals and heat treatment processes, mechanical indicators, trigonometry, spinning, spindle milling machines, pantograph milling, linear measurement gauges, test for straightness and squareness, optical projectors, surface grinding machines, linear measuring instruments and standards, external cylindrical grinding machines, internal cylindrical grinding machines, electrical discharging machining, numerical control, (*list repeated*).....– and all them were modules. And the ones that sound the same are at a higher level.”

(Frank)

The complexity of Frank's trade learning is evident in the dimensions of the list of technical learning in his fitting and machining apprenticeship. Spatial metaphors connected with particular learning trajectories, technical or otherwise signal metaphors of inclusion and exclusion connected to ways of knowing and who is allowed access to what forms of knowledge. The space that technical and vocational education occupies in a policy and institutional sense is insecure in that it is only ever understood in relation to industry and employment contexts. The industry and employment contexts relevant to technical learning are themselves seen as having less prestige than professional employment contexts. This contributes to a weakened and uncertain recognition of what technical education actually involves and how it contributes to individuals capacities for learning more generally.

Frank continued to work as a project engineer in the factory where he commenced as an apprentice. After fifteen years Frank was retrenched as part of industry restructuring and a company takeover. Frank returned to study and completed a diploma in liberal arts and then a degree in politics and sociology. Initially Frank wanted to continue his education in the field of engineering but found out that none of his apprenticeship training or diploma studies in engineering would be recognised if he went to university to study engineering. The spatial divide between technical and vocational education and university education worked against Frank continuing his education in a field related to his previous learning and employment in engineering.

“when I was going through all that stuff for engineering, when I wanted to get into an engineering course, I just got knock back after knock back. There was just something about the whole scheme that it was like everyone was trying to close doors on me. Or that’s the way I felt anyway. They were basically saying it’s not for you. You don’t have the right qualifications. And I was really, really disappointed because I thought and I was always told that everything that I was doing in the associate diploma of engineering will help towards a degree.”

(Frank)

After Frank took a voluntary redundancy he moved in to the liberal arts field of knowing because in his words he wanted to learn to speak better and learn more about the world.

“not knowing makes you confused about life and the world. But knowing, at least then you have an idea of what’s going on and why things are happening, which leaves less confusion.”

(Frank)

Frank makes himself anew through an education that although different from his technical trade learning is nonetheless concerned with making spaces that enable him to continue to be himself in a world that is indeed uncertain. Franks use again of education to remake himself underlines the pragmatic capacity to practice that he honed threw his technical and trade education and employment as a project engineer.

What was once a fundamental skill necessary for the past work and employment in the industrial production of bricks and functional tableware, ceramics in Louise’s experience of TAFE learning becomes essential to and important for the self. When asked what she had learnt in ceramics at TAFE Louise gave the following answer,

“Well, learning that you have to have space to make. And I guess now it impacts on my life in the sense I live in the city in a house, and I’ve got two rooms dedicated to space for making things, and I guess that’s quite a huge statement in itself. How important it is in my life, regardless of how much time I’m spending in it, I still have the space there for myself to go and do it when I want to, and that’s important for me. And I suppose studying gives you identity in that, and it allows you to be more confident in making a decision like that, I guess, too. Because it does qualify you. I guess there’s an element of that.”

(Louise)

The study of ceramics for Louise involved developing the technical and creative craft of clay based art. Louise develops the necessary discipline of learning through the 'projects' that she eventually wanted to break out of to attend city art university. TAFE learning for Louise provided her with the ability to be in the city, playing with clay in a disciplined way, and in so doing, developed her artistic capacities together with the autonomy to continue to create. Although it would have once been easy to argue the work-related nature of ceramics education today it is less easy.

Louise's ceramics education provides further insights into the space of technical learning because her story traverses ceramics learning in a TAFE context and then into a university context. Learning in both these sectors provides a comparative basis in Louise’s ceramics education. Louise describes the differences as being connected to learning techniques and the science of ceramics at TAFE with a more conceptual education in art at university. In focusing on learning techniques at TAFE, Louise provided the following example of the technical learning space of ceramics,

“The throwing class was good because that was really hard to learn to throw on a wheel. And I liked the different head space you accommodate when you’re on the wheel

compared to hand building things; it's a different sense of making, because it's intervened by a machine, I guess, too. And the teachers in that class, they'd come out with things, they'd come look at our work and break them if they were no good and stuff – I like that aspect of it – because it was about things being temporary and not being so precious about your artwork, and knowing that if something breaks you have to make it again. That was good. But that crippled some students – they couldn't deal with it at all. Where I actually would like to have taken the whole stuff outside and just go out there and smash it all and start again.”

(Louise)

The rigors of learning ceramics involve the arts and discipline of learning not to be ‘precious’ for Louise. Crafting clay on a wheel (throwing) as opposed to hand building allows Louise to accommodate a ‘different head space’ pointing to an internal space in which Louise engages in a ‘different sense of making’. The use of the wheel in contrast to handbuilding represents to habitation of a ‘different head space’ as well as a different organization and engagement with learning in the studio. These techniques along with developing knowledge about the geological and toxicology of clays and glazes is the stuff of Louise’s technical learning of ceramics. Technical learning of ceramics involved learning about,

“the toxicity of the materials and minerals, and poisonous minerals and ores that you use. And firing and safety ... And then we had the ceramics classes, ... we never really had separate studios – it was an open studio – and everyone mingled together in one big room. We did throwing or hand building and things like that. And then we had Design classes and Drawing classes.”

(Louise)

Louise understands her technical education in ceramics as ‘disciplined play’. Louise gets a ‘feel for the game’ through this notion of structured play. Louise connects this discipline to her own subjectivity as a child and the potential of connecting with people for learning into her future.

“Because I like clay, because as a kid I used to pull clay out of the dams. I’ve always liked clay. And I just wanted to play with it in a more disciplined sense, and learning more things. Like about the potentialities of clay that people with experience, teachers can give.”

(Louise)

Conclusion

Space provides an added dimension and insight into thinking through the social and subjective elements to an education that is concerned with making, crafting and being ‘technically inducted’ into a skill form and tradition. Given the randomness of contemporary sociality, categories while useful are unable to do the work that dynamics such as space and learning do. A hierarchy of education and knowledge where technical education is differently valued, understood and marginal to ‘dominant education practices’, misrecognises the worth of such learning practices. This hierarchical arrangement is unsustainable and it is ‘selves that make’ that come to understand this.

“No variety of human togetherness is fully structured, no internal differentiation is all-embracing, comprehensive and free from ambivalence, no hierarchy is total and frozen. The logic of categories ill fits the endemic variegation and messiness of human interactions.” (Bauman;2003, p 73)

It is not what the individual does or doesn't do but how the individual speaks themselves through their learning from the world and consequently themselves. I can do, I can also

make and craft something, and myself through the process. This is what technical education involved in craft knowledge provides to both Frank and Louise. As much as they know how to fabricate metal or form clay structures they learn to make themselves.

The resources of education are increasingly becoming tied to individuals' position socially, culturally and economically. Technical education spaces provide particular ways into knowing and being that are about real life, materially and metaphysically.

'Reality construction is the product of meaning making shaped by traditions and by a culture's toolkit of ways of thought. In this sense, education must be conceived as aiding young humans in learning to use tools of meaning making and reality construction, to better adapt to the world in which they find themselves and to help in the process of changing it as required. (Bruner; 1996, p.19 in Paechter, 2004, p.455)

Technical and vocational education is spatialised, wherein learning to do, to make and become embodied not as fillers for 'skills shortages' but rather as skilled subjectivities who have no shortage in ability to make themselves and their world. Developing the crafts of shaping metal and clay Louise and Frank learn the arts and disciplines of making themselves. Their 'toolkit' so to speak is not external to themselves but is corporeal, wherein they themselves are subjectively formed through skills of metal and clay.

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