

# Understanding Engineering Education Partnerships in Practice

Ronald Macintyre and Bruce Heil, The Open University in Scotland, Scotland

## Abstract

The project presented here is part of a long term collaboration between the Open University in Scotland and Unite the Union. The aim of the project is to provide routes into a BEng for those company employees who would not normally be able to access HE through mainstream company development. This paper explores the learning experience of a group of “shop floor” workers in a large engineering company and the benefits of that learning to the workplace. These are workers with vocational qualifications who are skilled or semi-skilled, they are used to “learning through doing”, and demonstrating competence through practices situated in the workplace. These are workers (now students) who have generally been regarded as not having “the potential” to gain HE qualifications. The paper draws on a series of interviews conducted over the last 3 years with staff from the engineering company, the Open University in Scotland, the Union and the workers/students. For a part time degree, distance learners at the OU will study for at least 6 years. The research tracks the long term experience of the different stakeholders. Through these ongoing conversations we hope to develop a rich sense of these learning journeys, at an individual, collective and organisational level.

All the learners are men, they describe themselves as coming from traditional working class backgrounds, as being practical rather than academic – work and the “shop floor” is where learning normally takes place. Economic uncertainty and the steady contraction of the engineering sector means the “shop floor” is no longer a “safe place”. Learners engage in HE study to differentiate themselves from their peers - job security away from the “shop floor”. At the same time the “shop floor” is key to their sense of identity, and something they are reluctant to leave behind.

As well as issues relating to identity, the learners also have to negotiate a number of organisational factors. For example, the organisation of the workforce tends towards autonomous teams, workers are rotated between different areas and shifts regularly which allows them to develop and demonstrate their competence – this is highly valued. However, changing work patterns interferes with their studies in a number of ways. It adds new work practices to new study experiences, breaks up informal learning communities, and means learners often have to renegotiate their studies with a new line manager.

The paper concludes with some reflections on what partnership means in practice.

**Keywords:** work, learning, practice, skills utilisation, Trade Unions, partnership

## 1. Introduction

This paper is based on a partnership between a Trade Union (henceforth the Union), a large Engineering firm, and an open and distance learning provider (The Open University in Scotland, henceforth the OU in Scotland). The OU in Scotland is the largest part time distance learning provider in Scotland, at any one time it has about 16,000 students spread across the whole of Scotland. It offers a full range of modules and qualifications across the academic spectrum. It is an open and blended learning provider; this means that there are no entry requirements and the delivery model features a mix of face to face and virtual communications and a range of physical and digital learning sources. This paper traces the story of a range of students within a specific workplace who are studying

for a Bachelor of Engineering. The information presented in the paper focuses on the most recent set of a series of interviews conducted with learners and participant observation other partners over the last 2 years. The first set of interviews have been reported already (Macintyre and Heil 2011), and these primarily focussed on the form and function of the partnership. The data presented in this paper moves away from that direct focus on “the model”, approaching it indirectly through a more specific focus on what it means to learn in the workplace.

## **2. Understanding Work and Learning**

The review begins at the macro level and looks at the political social and economic context of work and learning. The review then turns to employee relations and workplace culture, in particular developing the ideas of Fuller and Unwin's (2003) expansive -restrictive framework, where expansive work place cultures that tends to offer more opportunities for learning in the workplace. Finally review explores learning itself, starting with the opportunities for potential learners it then looks specifically at learning in the workplace. Here we draw on recent research to learning that approaches it through material practices (Fenwick 2010 ). As we felt drawing the structural commentary together with the focus on everyday practices in the workplace would help us to understand what it means to be a learner in the workplace.

Political interest in work and learning and skills stems from research into economic productivity and demographic factors. Developed economies face demographic challenges. The workforce is ageing, the majority of people who will be in work in 2020 (70%) have already left education (Little 2010). The skills required within the economy are changing, and as the recession continues and older workers remain in the labour market for economic reasons (and young unemployment increases) (Goodwin and O'Connor 2012) so the role of Higher Education changes. Despite a relatively high investment in the production of skills the UK (and Scotland) labour productivity lags behind other developed economies (Scottish Government 2010). The identification of these issues has led to the recognition that economic productivity is not simply a supply issue, but also a demand issue. The OU in Scotland first conscious “turn” to focus on working and learning came through a Scottish Funding Council (SFC) project on “Skills Utilisation”. An external evaluation of the programme (Payne 2011) identified some of the inherent difficulties in understanding and measuring the benefits of HE to employers. This has led to a shift in the way policy understands skills from an early focus on “hard” measures based on how learners might employ HE level skills in the workplace, to a more subtle understanding that emphasises the better use of existing skills alongside the use of better skills (Findaly and Warhurst 2012).

Our own understanding is conditioned by our social mission. Typically employers tend to investment most in those who already have a good set of qualifications (Marr *et.al* 2011). This partnership was based on a Union led survey of members and identified a demand for Higher Education (typically a B.Eng) amongst shop floor workers, mostly people with apprenticeships or Higher National awards. Encouraging these learners to articulate into Higher Education is a key government priority for the Scottish Government (2010), as there is a tendency for people from lower socio-economic groups to see these vocationally focussed qualifications as a “safe place” (Esmond 2012; Bradely 2012). This means that

articulated people from those vocational qualifications into HE (i.e. encouraging life long learning) is likely to broaden the social base of HE while improving the level of education of those in the workplace.

These different understanding are important, because “Skills Utilisation” within industry is related to High Performance Working Practices (HPWP). HPWP draws on the rejection of the Fordist and Taylorist approach, the so called post -Fordist's emphasised the work design should benefit employers and employees, and Japanese style management which focuses in learn production and “kaizen” (continuous improvement) (Hughes 2008). It advocates the development of a skilled, flexible and specialised production workers, based on observations that small firms were able to be competitive by having highly skilled and flexible workers, and the lean or just in time production model. (McKay 2006). Involving workers in production decisions, making them responsible for productivity and quality (through incentives) and involvement in training all characterise HPWP (Hughes 2008). On one level the development and use of skills inherent in HPWP is good for the employee and good for the company. Questions do arise about how compatible HPWP is with the liberalised labour markets found in the UK, as the neo-liberal approach to employment tends to encourage the “low road” (low pay/unskilled) to increased productivity. Clearly care needs exercised that HPWP translated to a UK context does not simply mean people have to work harder and longer under the same terms and conditions (Green 2010).

This partnership also is part of an established relationship with the Scottish Trade Union Council (STUC). Key to this are Union Learning Representatives (ULR); they existed to some extent in workplaces since the inception of the Union Learning Fund, but were only truly brought into the workplace through legislation passed by the UK Labour Government in 2002, granting them statutory support under an amendment to the Employment Act (Lee and Cassell 2009). Their member facing role is about encouraging people to engage in learning, conducting learning surveys, providing support, and organising learning provision. A relatively recent major survey of the role of Unions in workplace learning in Scotland found that the Union role was both in meeting and stimulating demand (Findlay *et.al* 2007). In a recent update (Scottish Government 2010) of its earlier (2008) review of Skills Utilisation the Government identified the key role that Trade Unions and learning representatives have in bringing people back to learning, and starting discussions about learning in the workplace.

Trade Unions in the UK have raised concerns about HPWP, in particular in relation to intensification of work, but also in relation to the ways employers restrict access to learning. Partnerships between private and public sector organisations (like the one in this paper) are often seen as a way to deal with the failure of the neoliberal market to deal with the supply and use of skills in the workplace. We can see from our brief discussion of Skills Utilisation and HPWP that skills are a complex term with multiple genealogies. This section has not been a systematic review of those tensions. It touches on are some of them to provide background to the data. As it our sense that we will gain a better understanding way that policies work in and through practice (and the potential tensions on the “shop floor”) through opening up those tensions.

The focus of this paper is a programme that “hosts” learning in the workplace rather than being based there. However, it will only succeed if the workplace is capable of supporting learning through practice and reflection that may often be developmental rather than part of an employee's substantive role (Lester and Costely 2010). This leads us consider whether some subject and sectors are more able to provide that support for learning. Ahlgren and Tett (2010) found that the care sector tended to have a more expansive approach. As a “soft applied” sector there are strong links between academic and practice based discourses, and the academy and the workplace are intimately tied. Own own research into this sector (Macintyre and Patel 2013) has found that the applied nature of this area can ease the transition from being a practitioner to being a student.

The pattern of variations in the application of expansive learning frameworks is common across sectors. For example, a study of “shop floor” learning in the steel industry in different European states found that managers tended to restrict learning opportunities for shop floor workers; training was on the job, machine specific and designed to meet short term goals. At the same time some of these organisations were bringing in new production methods that included more flexible roles and “team” approaches, approaches that suggest HPWP. Despite apparent changes to working practices that ought to promote skills utilisation within these large workplaces, it did not equate to changes for all workers (Stroud and Fairbrother 2006). Those on the “shop floor” still had their opportunities restricted even when HR discourses appeared to promote HPWP. This partial or hybrid application of the expansive framework echoes our earlier discussions of Skills Utilisation and HPWP. It suggests that what is regarded as an appropriate work, skills and learning environment varies between sectors, and even within sectors it may vary depending on your role within that organisation.

This variation is important for engineering, for as an applied subject (like the care sector) the potential exists for close links to be made between learning and practice. For example, engineering education itself has a particular culture or way of knowing. Engineers tend to think of themselves as dealing with real things that can be quantified, measured, understood and applied, effectively practice based knowledge that related to “real life” (Godfrey and Parker 2010). Practice is not simply a description of the things that people do, it is fundamental to the way we learn (Nicolini 2011), and from that we can see that in the workplace the realm of possible practices and learning opportunities is conditioned by the learner, their social interactions, the organisation, its culture, and the material fabric of the workplace. This sounds similar to Fuller and Unwin’s (2003) expansive restrictive framework; however the focus on practice allows us to extend our focus to the social and the material. It means when we look at work and learning we can explore the complex socio-material interactions. Exploring the material in the socio means thinking about human and non human process, the tools, technologies, objects, bodies and actions, texts and discourses (Fenwick 2010).

Approaching work and learning in this way also means accounting for the flow networks. For example, understanding how some of the macro level Skills Utilisations’ policies, or HR rhetoric in HPWP works at the scale of the workplace involves accepting that it passes through networks it is translated and adapted (Fenwick and Edwards 2011), it is shaped by the social and materials interactions, from the culture within an organisation to tasks performed and the geographic layout of the working practices. Some of that network approach has been implicit in our earlier discussions of the tensions between the different partners interpretation of what skills means.

### 3. Methods

Our principal research tools were participant observation and the semi-structured interview. The idea was to create a longitudinal study that traced learner's journeys through the duration of their engagement with the HE in the workplace.

We decided to conduct annual interviews with the same participants through their learning journey. This paper draws on the information from nine people, for three of them this was their second recorded semi-structured interview. One of the benefits of semi-structured interviews is that the interviewer can be responsive to themes that emerge within the interview (Punch 2005). We wanted to capture the experiences of people who were moving from being workers to workers and part time distance learners. As other research suggested that these transition narratives might provide us with a deeper understanding of student's learning journeys (McCune *et.al* 2010). As this is a long term relationship when we invited participants to be involved we were clear that we would be talking to them on a regular basis about their experiences, and be conducted taped interviews each year. However, in taking this biographical approach we note the tendency to privilege individual agency and choice, at the expense of social and structural barriers that constrain those choices. Thus, when we talk about "choice", it is with the tacit understanding that choice is often limited and constrained. When looking at the choices that people have, in particular as we take a biographical approach to allowing people to narrate their own transitions and choices, we need to be aware of the influence of social class in constraining those choices (Furlong 2009)

In thinking about how we act and how the actions allowed within the workplace we are not simply thinking about social aspects, but also material ones. This helps us to understand how practices become situated, or "everyday", within particular contexts. As noted earlier, these "everyday" practices become routine, and we often fail to account for them adequately (Nicolini 2011). The partnership by its nature involved frequent informal conversations with stakeholders, either on the phone or face to face. These informal observations and the notes and diary entries associated with them are also a useful data source. Not least because it is through these that we are able to observe the "everyday", we are able to explore the geography of the factory, and respondents are able to "show you what they mean" and situate the social in the material.

We used tape recorded interviews able to draw out and develop the subtle "everyday" practices related to work and learning. Interviews were recorded, and then reviewed immediately after each interview. The ongoing review of the data and the identification of emerging themes was the first phase of data analysis (Cousins 2009). After transcription the interviews were manually coded. This involved a careful reading of the transcripts to identify a series of dominant themes (Baxter and Eyles 1997). Each transcript was then coded for each main theme and related and/or sub themes. In addition to identifying the most frequent themes attention was also paid to the meaning and context of less frequent responses (Cousins 2009). Exploring the phenomena that people encounter in the workplace, their subjective understanding of those phenomena, and how they interpret those phenomena helps us understand how people relate to the people, systems and objects around them (Lofthus and Higgs 2010).

### 4. Results

#### 4. 1 *The Shop Floor*

The factory itself is on the outskirts of Glasgow, it is less than a decade old, it is a modern

building with up to date manufacturing facilities. About 1000 people work in the factory. They work on three shifts, day, night and back shift. Work is organised into a series of lines, with components being “made” in the forge and then moving through a number of different CNC machines and “milling” process to completion. This includes a series of inspections, often tactile and visual. Within these lines people are organised into small self directed teams called “cells”. These “cells” are responsible for the productivity and the quality of the output from their part of the production process.

Our earlier review of the lineage of skills utilisation and the links to HPWP noted links to Japanese lean production methods, and in particular the recognition that small teams of highly skilled workers that take responsibility for production lies at the heart of the HPWP approach (Hughes J. 2008). What we observe in this factory is a “hybrid” HPWP model. “Cells” are not responsible for the whole of the production process, it is still broken down into components on the line, while there is horizontal integration (within the shop floor workers) into these teams, there is no apparent vertical integration, and people “upstairs” still work within a traditional hierarchical structure. What these bundles of HPWP (Stone *et al* 2012) means for employees everyday practices is that they have to complete an individual “skills matrix”, reviewing and being responsible for their progress in gaining competence on a series of machines. The “skills matrix” is placed in a visible public area on the “shop floor”.

This “hybrid” model has broken down team tasks into fairly small and mechanistic units. This limits the agency or ability to engage in anything outside the limited range of production tasks associated with the part of the production process that the “Cell” is responsible for. This reduces the ability to make better use of skills or use better skills (Findlay and Warhurst 2012). The only way they can extend the “skills matrix” is through internal shop floor movement, either to another cell, or possibly through a secondment to a ME led project in “the office”.

Our first set of interviews included the Union perspective, and they drew clear links between the restructuring of work into teams that were introduced with the new factory and the Unions interest in skills and training, in particular the wish to see this as a part of any bargaining between the Union and the employer. Given the reservations raised earlier it is worth looking at the role of the Union (and the partnership more generally) in more detail.

#### *4.2 Peer Communities and Collective Learning*

The Union was keen to emphasise the idea of “collective learning”, where the collective stemmed from the root and philosophy of Unionism as collectively working together for the benefit of all members, here learners were encouraged to study together, and to help those around them with their studies. As a distance learning provider this was an interesting area for us. Distance learning is often seen as largely a solitary and self directing activity (Macintyre and Macdonald 2011). The focus on collective or peer learning, the presence of the ULR's in the workplace, and our own ability to access the workplace to provide academic and pastoral support suggested that we might be able to “host” an enhanced support model in the workplace. Concerns about peoples sense of being part of an academic community, this is a known issue in distance learning (Macintyre and Macdonald 2011), and distance learners in other applied disciplines can also struggle to develop their identity as a learner (Watts and Warraker 2008). Our early research, albeit with small numbers, indicated that students the focus on collective learning improved the “student experience”, including retention and progression in comparison with the OU Engineering population in general (Macintyre and Heil 2011). .

As well as touching on the benefits the learner also begins to touch on some of the aspects that destabilise those peer communities. For example while scale of the factory works for us as a learning provider, the economies of scale allow us to provide the enhanced support, it may actually make it difficult to form peer communities. However, it is not just the geography of spatial arrangement of working process within the factory that can disrupt the formation and ongoing stability of peer learning, it is also the temporal aspects like shift patterns.

*Well I've not really had a lot of interaction with [persons name], but once again [he] works different shifts pattern from me and trying to actually kind of get a hold of him is the hard bit, you know what I mean – we're all in that factory at different times, it's hard to sort of bring us all together, you know what I mean, ... (Participant G)*

The emphasis on a flexible and skilled workforce, the need for workers to maintain their practice based skills to promote internal employability means that people are expected, and want to move into new teams, with new machines to learn new skills, as this is the only way to update the “skills matrix” even though this disrupts existing social relations. This disruption is not just within the informal grouping of students, it means establishing new relationships with line managers and renegotiating aspects that relate to study and learning a new set of practices, as they learn the new machine and the production process. Participants value this opportunity as it means updating their skills matrix and improving their internal employability. However, learning these new practices can disrupt HE study, not just moving out of the support networks, but the pressure of becoming competent to use a new machine while also managing studies can be too much. For example this learner talks about learning in the workplace

*I am going through a learning curve in work at the moment as well regarding new jobs and new types of engine. ... its hands on, its just like getting to use different types of fixtures, different set ups' for jobs, different methods, and obviously its a different section so there are different process's ... (Participant E)*

While the narrative is positive about the opportunities to gain new skills through changing roles and shifts, later the learner began to talk about the effect it has on his studies, they way it disrupted vertical networks with line managers, but also the “double learning” of acquiring narrow practice based skills for the “matrix” alongside higher level skills associated with HE. Even though distance learning is by definition flexible, and many participants spoke about coming in an hour early to study (for example in the car park), or reading during breaks, it does have fixed points. It also requires time and attention, and many participants spoke about the disruptions caused by shift patterns and the additional pressures of learning new practical skills alongside HE study. What we see here is the way that restrictive management structures to develop lower level skills can disrupt the acquisition of higher level skills. This appears to occur through the disruption of social and materials relationships, something that destabilises our support model.

#### *4.3 The “Benefits” of Higher Education*

When we began to explore the benefits of HE more closely, we also looked at the costs in terms of the effect on family life and “free time”, and how in assessing that balance we started to look at what motivated people to engage in study. It was often about a destination, a chance to get away from shift work and the shop floor into a new role with better terms and conditions

Interviewee: *At least you can see, its not as if I am doing a degree that doesn't really*

*apply, .... I can correlate absolute benefits to it, you know I work a shift pattern in the office they don't, its like a wee bit more money and all this different stuff so you know that generally a better quality of life is there if you apply yourself properly. (Participant D)*

The physical geography of the factory helps people to visualise that progress. However, it is by no means clear how “real” the move away from the shop floor is. In fact where we have the partial adoption of teams and HPWP, where only segments of the business are involved, as we do here on the shop floor, it may make it more difficult to go move into a more senior role (Stone *et.al* . 2012) For others the route from the “shop floor” is less clear. We found that for many of the older learners their identity was closely tied to their competence and role on the shop floor. Even when they imagined progressing, it was not to one of the “office jobs” noted above, but instead to a role that maintained their connection to the “shop floor”.

The principal benefit from HE study seemed to be as means to cope with economic uncertainty that presently lies over the factory. At the time of interview one part of the plant was being dismantled and shipped overseas, along with it goes that particular production process, and jobs are at risk, nobody is sure what, or if, it will be replaced with a new production process. The uncertainty is also linked closely with the desire to study, as if jobs are to be lost engaging in HE is a way to differentiate them from their peers.

*Quite an interesting development will be happening in [The Factory] we will be sending work [overseas] ... they are going to be filling the shop floor with other work so therefore there will be many more possibilities, so it will be interesting so see what that is as well, that would suit my skills and experience (Participant F)*

There is also a recognition that within this uncertain environment, the possibility of new production process and new roles may, roles that those who have put themselves forward as HE students (have shown willing) may be able to grasp. Research into the role of Trade Unions in developing higher level skills in the technology sector noted the potential tension between individual achievement and the Trade Unions focus on collective learning (Davies S. 2008). It is clearly the case here. Earlier we noted that Unions may need to be cautious about embracing the Skill Utilisation and HPWP agenda, as it tended to individualise workers experience, and through its monitoring and incentivising of individual skills and output, it might be seen as an attempt by employers to bypass the Union (Hughes 2008) . One could argue that despite the team approach what HPWP does is individualise the workforce and reduce the interest in or influence of collective bargaining (Lui *et.al* 2009). The benefits of HE learning, even when done collectively, accrue to the individual. For the interviewees in this study the benefits are the ability to improve their internal employability (and many have identified routes), but also to secure their employment status by differentiating themselves from their peers at a time of economic uncertainty.

## **5. Conclusions**

In the early stages of the partnership we noted that confluence between the employers team approach (“cells”), the Unions focus on collective learning, and our interest in the role that peer communities had in supporting distance learners (Macintyre and Heil 2011). In many ways this paper is about challenging our own earlier research where we perhaps focussed too much on the benefits of the partnership. Our early research was about “first impressions”, our first impression as action researchers implementing and evaluating the partnership (see Payne 2011), but the first impression of partners with each other. The



methodological approach to returning to the factory and the learners regularly has meant we have moved beyond those first impressions as action researcher, just as the partners have moved beyond those early encounters and the practice of learning has begun to settle into the everyday practices of the factory. We are now beginning to see the ripples associated with that settlement.

In this paper have highlighted some of those ripples. In particular we explored the tension that is emerging between the formation of peer learning communities in the workplace that support higher level skill development, and the HR structures employed by the company to monitor and evaluate low level skills through a “skills matrix”. Informed by HPWP the employers approach to skills for “shop floor” staff focuses on a restricted set of material practices. We have found that participants value the acquisition of this practice based skills because of economic uncertainty over the future role of the factory within the companies global business. The “skills matrix” is about improving the internal employability of the workers (Pegg 2010). However, acquiring those practice based skills involves moving into new “cells”, new shifts, and onto new machines. This spatial and temporal movement disrupts the development and maintenance of peer learning communities and vertical networks with line managers. In addition, learning the new practice based skills associated with these new machines effects peoples ability to study. It is clear that we need to look much more closely at how we might work with the company (and their understanding of skills) in ways that do not disrupt the ability to use and develop their HE level skills.

Economic uncertainty is also part of peoples motivation for engaging in HE study. They see the willingness to engage in HE study as a way to differentiate them from their peers, and improve their internal employability. This would seem to run against the Unions focus on collective learning, and clearly there are tensions. As yet we have not seen those tensions rise to the surface. But clearly we need to look carefully at HE as a individual and “common good” in our future research.

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