

WARWICK INSTITUTE *for*
EMPLOYMENT RESEARCH



Learning while working in small companies

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Extracts from Part Three of the report that draws together the key findings from the Fifth Framework Project 'Towards sustainable employability through participation in continuing vocational education and training (CVET)' with contributions from Eduardo Figueira, Florentino Blázquez, Alan Brown, Philipp Grollmann, Olympia Kaminioti, Manuel Lucero, Massimo Tomassini and Roland Tutschner

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A copy of the full report can be downloaded from:

<http://www.skope.ox.ac.uk/WorkingPapers/SKOPEMON07.PDF>

Further information about the interface of research, policy and practice on workplace learning is available from:

**<http://www.guidance-research.org/EG/LLLtop/workplacelearning/>
and**

<http://www.tlrp.org/proj/Workplace.html>

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1. Introduction

The PARTICIPA study initially aimed at analysing the structural, organisational and individual factors that influence technical employees' decisions to participate in continuing vocational education and training (CVET). The study focused upon employees using technical skills from industrial small and medium size enterprises (SMEs) in England, Germany, Greece, Italy, Portugal and Spain. The study broadened, however, to consider the interaction of working, learning, performance, development, networking and knowledge creation of technical workers in SMEs. The findings from the project have been reported in detail in an earlier series of reports (Brown *et al.*, 2004a, 2004b, 2005).

This paper is drawn from the report on key findings to draw out the implications of the 'lessons learned' from the project for policy, practice and research. It uses extracts from some of the commentary on key factors influencing technical workers' learning and development in SMEs. The full report can be downloaded from:

<http://www.skope.ox.ac.uk/WorkingPapers/SKOPEMON07.PDF>

2. Individual factors affecting participation in Continuing Vocational Education, Training and Learning

Self-directed learning

This sense of self as an 'experienced skilled worker with particular types of technical and other expertise' was perhaps clearest among those whose work-related identity incorporated a view that they needed to play an active role in shaping their own learning and development. As a technician's career develops self-directed learning often becomes increasingly important. Indeed learning as a self-directed activity was often built into the job, especially where it required diagnostics and troubleshooting.

Adult (non)participation in learning

Individuals who were seen as 'non-learners' could be split into two different groups. First, there were those individuals who would like to undertake learning but were unable to do so because of external barriers and, second, there were those who did not want to engage in learning, through lack of confidence, motivation and disaffection. The needs of the former group could be addressed by paying more attention to the location, cost and timing of some programmes. Programmes for the second group, however, need to pay particular attention to attitudinal issues, including the development of confidence and motivation.

Experience of learning and working exemplified through individual biographies

Individual biographies can exemplify different 'types' of attitudes towards continuing vocational education, training and learning. One individual may give particular emphasis to **participation in formal CVET** as an important element for individual progression. Although even here such a strategy may not be used exclusively, for example, a dual development strategy could be used, where formal training is used to update technical skills while learning through experience of working intensively with clients could develop

communication skills. For another individual it may be that workplace learning is preferred. Indeed in some cases success in this form of learning can act to transform attitudes towards learning more generally. Learning experiences at the workplace were sometimes very rich. They could include **learning while working** in a job with considerable challenges; learning through working with someone with acknowledged expertise; learning through working in multi-disciplinary teams; learning through organised reflection and review; learning through the application of knowledge learned in CVT to work activities; learning through working with suppliers; learning through exposure to other working environments; learning by doing without any formal training (e.g. through giving presentations). The combination of different forms of learning can occur even where the focus is upon process improvement, with learning and skills development as a means to an end rather than as an end in itself. Work-related learning can be driven by a strong commitment to **self-directed learning**, where an individual is interested in a search for understanding, solving problems or has a positive attitude towards learning.

Implications of individual differences in approaches to continuing vocational education, training and learning

The above examples illustrate that technical workers do have very different approaches to learning and development. The cases also exemplify three distinct approaches to learning and development, according to whether greatest use was made of formal CVET provision; opportunities for learning while working; or self-directed learning. Some individuals made regular use of formal CVET provision, with courses lasting from a few days to several years. The longer courses, such as Master's programmes, were often taken in an individual's own time. The second group mainly took advantage of learning while working, highlighting the rich array of learning experiences that could be utilised if work itself was challenging. This included learning while working in a job with considerable challenges; learning through working with someone with acknowledged expertise; learning through working in multi-disciplinary teams; learning through organised reflection and review; learning through the application of knowledge learned in CVT to work activities; learning through working with suppliers; learning through exposure to other working environments; learning by doing without any formal training. The third group made use of self-directed learning that remained outside either formal education or training and did not take place at work. Here learning and technical updating was accomplished through self-directed study, for example, using technical books and through searching the Internet. Another means of learning was through personal networks, where for example two or more technical staff from different departments or companies would regularly meet socially but also use the occasion to discuss their work. This could specifically include discussions about new developments, different ways of approaching problems or reflections upon work processes.

In practice, many people use all three forms of learning. Additionally, it was striking that some of the most successful forms of learning identified in the interviews occurred when the aim was improving business effectiveness, through a focus upon improvements in quality, cost reduction and delivery. In these cases learning and skills development was seen as a means to an end rather than as an end in itself. It was also noteworthy that such approaches could stimulate small companies to pay more attention to processes that led to significant employee skill development.

Value of broadening focus from participation in formal CVET activities to participation in work-related learning

Learning at work, as either an individual or a collective activity, is often grounded in working practices rather than comprising predominantly individual effort on continuing vocational training programmes taking place away from the workplace. The whole idea of focusing largely upon participation in formal Continuing Vocational Education Training therefore has severe limits. Participation in a wider range of work-related activities needs to be considered in order to adapt to a changing conception of learning and knowledge in which the orientation towards competence development and the integration of learning and working (including through the use of informal and non-formal learning) are emphasised. The paradigm of enrolling and participating through being taught and taking home a qualification makes way for a more fundamental conception of learning, which sees potential for learning in all kinds of different human activities, among which work plays a significant role. Similarly, in many settings it makes sense to switch the unit of analysis between the individual and the company or network. That also means that learning can be situated within a broader context of organisational development and performance and acknowledges that work-related learning has a very strong social dimension. Individuals stressed time and again that collaboration with peers and colleagues was important.

3. Institutional and organizational factors affecting participation in Continuing Vocational Education, Training and Learning

Participation in formal CVET programmes

Innovation and change as a challenge for formal CVET provision

Role for less formal forms of professional development

Organisational culture

Challenges for successful small firms not focusing on longer-term development

The success of small companies could partly depend on the way they handled, either explicitly or implicitly, two key challenges: how to focus upon, protect and develop their core competencies and how to avoid the gradual development of 'skilled incompetence'. The case studies showed that companies were often quite good at protecting and developing their core competencies, even if it was not a formal goal. Meeting the challenge of the development of 'skilled incompetence' (Argyris, 1990) was much more of a challenge. For some companies the **current way of doing things**, including the constant search for and focus upon technical development, **meant they neglected more strategic considerations**, including plans for the professional growth of staff and opportunities to reflect systematically on their ways of interacting externally. A number of case studies were examples of successful SMEs who were exploiting opportunistic approaches to learning and business development.

Several effects of the accumulation of 'skilled incompetence' (Argyris, 1990) might be expected in an organisation that does not develop specific plans for professional growth. A company's small-size allows fast knowledge sharing among people, ensuring less dependence on a single resource and improves role flexibility. Yet the company's model of investment on human resources should be developed in order to comply with conditions of both keeping key human resources and achieving long-term objectives. Moreover, the occurrence of significant reshaping of technological activities due to breakthrough events, or even to the effects of incremental innovation in the field, might cause unforeseen problems in an organisation which does not systematically reflect on its ways of interacting externally, its community practices, and its approach to applying technological solutions. In such circumstances public policy should be directed at offering support for apparently dynamic and healthy companies in looking at the broader horizon and considering the company as a unity – not only in terms of its individual members – and should take specifically into account its existing external and internal learning paths.

4. Broad contextual factors affecting participation in Continuing Vocational Education, Training and Learning

Increasing skill intensity of technical workers' jobs

Continuing vocational education, training and learning in the IT industry

In the UK an important focus is upon learning while working through responsibility in the job itself, whereas in Germany much greater attention is given to preparation and learning for responsibility through a comprehensive programme of initial training. Another crucial difference is that frequently moving between employers is much more common in the UK than in Germany. In the UK context such mobility means the transfer of skills and knowledge, including tacit knowledge, is facilitated through staff often changing their jobs (compare Mason and Wagner, 2000). In all countries employers sought to develop the skills of their workforce - both their technical and 'soft' skills of communication and teamwork. There is a strong demand from employers for skilled workers with 'modern' skill sets, including abilities to work in teams and communicate effectively.

Continuing vocational education, training and learning in engineering

Generally greater attention is being given to work-based learning, in relation to team-working, continuous improvement programmes, supervisory training and supply chain development. External training and qualifications are also being used either for some staff or as part of general employee development training. Companies vary greatly in the extent to which regular work activities provide a rich or poor learning environment, depending upon how work is organised, the nature of production and the size of the company. Different groups of workers may also have differential access to further education and training. Overall, employers' commitment to learning is very variable, but general competitive pressures and actions across supply chains is driving at least some learning in the workplace.

5. Learning factors affecting participation in Continuing Vocational Education, Training and Learning

Formal support is vital in early career learning

Much of what a technical worker learns occurs within the frame of 'normal' work activities. The key is to have some means of checking whether the development of particular skills and competences are occurring alongside the development of the ability to perform specific functions or activities necessary to fulfil one's job. There is an irony here in that the value of more diffuse forms of learning increases the importance of some formal support early in a career: technical workers had a strong desire to know how they were getting on and explicit feedback on their progress was highly valued.

Learning from others (in work groups, communities or networks)

Learning from interaction was widely perceived as a valuable process and learning from others was an important strategy for technicians in most contexts across all countries. A work environment rich in opportunities for development of technical workers allows forms of continuous learning from others. These include learning from members of the work group and professional communities; learning through opportunities for interacting with more senior members (sometimes with explicit intention of 'passing on' knowledge and experience); and learning through exchanging information and knowledge outside the organisation (especially with clients and suppliers). In such circumstances, in innovative SMEs, ways of working and learning are based on collective sense-making, a perspective that emphasises engagement in a common enterprise perspective and mutual support. Learning is intrinsic in ways of working in which employees' co-operation and competition coexist.

Importance of formal knowledge development

'Learning' is therefore often intimately bound up with 'sense-making': interacting within communities and networks is a fundamental way for constantly re-building personal cognitive approaches to specific issues and re-constructing the sense of the whole work experience. However, even where experiential and social learning are widely diffused, formal approaches to learning can help in a wider process of sense-making. That is, even where codified knowledge is spread through a mixture of diffusion through communities coupled with self-learning practices, formal approaches to learning can potentially take sense-making to a new level, not least through a process of systematic engagement with cognitive and imaginative faculties not necessarily always used in more regular activities.

Need for support for learning at work

Organised learning support could play an important role in the development of knowledge and skills of technicians. The organised learning support could involve the use of mentoring and coaching; rotations, visits and shadowing; reference to 'experts', but the number of cases of 'good practice' were overshadowed by examples of where the absence of organised support for learning on-the-job left people struggling 'to sink or swim' partly according to how well they put their own arrangements in place. Feedback from colleagues, and consultation and collaboration within working groups could be

particularly useful, as could processes encouraging mutual consultation and support. Membership of task groups or project teams could help people develop new skills, fresh perspectives or deepen their organisational or contextual understanding. One key aspect of personal development was whether the individual was able to access the often tacit knowledge that was held by particular individuals rather than embedded in social activities. Personal networks could therefore be vital in speeding the process of continuing learning and development.

Need to support the development of hybrid skills

That is there is a need to focus upon the development of hybrid skills as well as, rather than just, technical skills development. Hybrid skills refer to the ability of people to harness technical skills in support of business development.

Value of individuals working across a range of contexts both within and between organisations

It was noticeable that both the individual biographies and the case studies drew attention to how much individuals learned from having to apply their skills, knowledge and experience in a variety of different contexts – whether this was within companies or was linked to individuals working across a range of organisational contexts (whether of suppliers, customers or clients). This was helpful not only because it often injected additional challenges into work activities but also because it often led to reflection upon different ways of working. The examples from England, Germany and Italy also drew attention to the effects of interaction of companies in patterns of learning in SMEs that were embedded in various networks.

Learning through competence development and growth of work process knowledge

Competence development was seen as linked to the acquisition not only of specialised knowledge concerning technical aspects of the work processes but also to relational aspects. These were based on the interplay between different roles and activities within organisations and the ability to interact effectively with clients, suppliers, competitors and other people external to the organisation. There was a sense in which the development of a thorough work process knowledge (Boreham, 2002) was an important goal of individual learning and sense-making and the platform for further learning and achievement of acknowledged expertise. Work process knowledge is that knowledge of the business production and labour processes in the organisation which is created and circulated through co-operative arrangements at different levels of an organisation, allowing continuous learning and process improvements.

6. *Creating contexts that facilitate work-related learning for technical workers*

Responding to the trend for learning and working to move closer together

One clear trend within workplace learning is the extent to which working and learning for technicians are drawing closer together. In particular, there is an increasing awareness

that learning and motivation are influenced if activities are embedded in contexts that make sense and are important for the learner (Raizen, 1994). Although there may also be times it is important for the learners that some distance is put between learning and work, so as to generate breadth of perspective. Indeed Eraut (1994) raises the question of whether successful workplace practice can necessarily be equated with a capacity to understand the ideas and concepts that inform such actions or to transfer them successfully to other contexts. For example, experienced practitioners may be seeking broader perspectives, theoretical understanding and so on. Engeström (1994) also points to the contribution theoretical concepts can make to assist individuals to understand what they are doing and why work practices are subject to change. So while meaning for the learner may often be increased by getting closer to working processes, in other cases putting greater distance between learning and working may be appropriate.

Policy Point: there is often value in promoting learning while working, but it is also vital to acknowledge that there are other circumstances where it is important for the purposes of learning to put some distance between learning and working.

Problematising the link between learning at work and qualifications

Policy Point: is it possible to offer institutional support to a system that looks to develop employees in ways considered to be meaningful by the individuals concerned (rather than necessarily fitting the requirements of formal education and training)?

In such an approach the formative nature to competence development could mean that the focus is upon where does the individual go from here in the light of the competences they (believe they) possess. This could be an inclusive process open to all, whether or not they want to seek formal qualifications, have their existing competences recognised, or undertake formal education or training. The key point here is that the competence review looks forward and focuses upon individual learning and development. It is also important to build a stronger dialogical element into those cases where a link between non-formal learning and formal qualifications is appropriate. Reflective dialogue and evaluation can be used to broaden and deepen learning in the workplace (and in part compensate for the possible narrowness of experience in the work tasks performed by an individual).

In a number of contexts, there was also a feeling that some types of qualifications were not at the right level of aggregation. It may be helpful to introduce assessment of the key aspects that underpin effective performance as an experienced skilled worker. Note some large companies are seeking to specify their skilled worker requirements in terms of say 6-12 major activities crucial to effective performance.

Responding to issues raised by the differential access to opportunities for learning of different groups in the labour market

One particularly unfortunate side-effect of the polarisation of learning opportunities in jobs is that opportunities for significant learning while working are correlated with encouragement of self-directed learning. The challenge of work seems to drive self-directed learning both within and outside work. In learning-rich jobs competence development is intrinsic to work and supports the emergence of acknowledged professional identities. In contrast, where conditions for learning from others and challenges in work are poor – as in organisations offering low quality jobs in the software

sector – then opportunities (and motivation) for self-directed proportionally decline too. Several negative loops are in place within stagnant or declining organisations where the lack of opportunities for professional growth represents a depressing factor inhibiting the formation of strong professional identities within the organisation and at the same time undermining motivation to engage in other self-directed learning outside work, except in those cases where this acts as a spur to get on and get out.

Production and employment structures could be polarised in ways that do not reflect organisational size: with the technical employees of SMEs having access to some of the most learning-rich jobs as well as some of the most learning-poor. That is, on the one side, there are employees engaged in highly innovative work, while, on the other side, there are those in low-level jobs almost completely detached from any sense of innovative dynamics, with the jobs themselves often close to disappearance. This presents a particular challenge for public policy since if it is to align the interests of the individual, company and state it must find a way of engaging the interest of the company in supporting access for employees to learning opportunities.

One policy recommendation could be that financial support for CVET measures and guidance about CVET opportunities could be targeted at employees from SMEs because these employees and their companies often do not have enough financial and time resources to take part in CVET courses. This might pick up some employees who are willing to engage in further learning in their own time, but this measure alone would be unlikely to galvanise participation from small companies that do not already acknowledge the value of learning and development for improving organisational performance. For these companies a focus on the latter (improving organisational performance) may be more attractive until they begin to appreciate the value of learning and development. Hence a focus upon supporting small companies more generally (aimed at making them more effective) may be more successful for those without a commitment to learning and development. In such cases it may be that learning and development are then seen as a means to an end rather than as an end in itself.

Policy Point: is it possible to offer support to small companies to help them become more effective, where learning and development is seen as a means to achieving a broader goal rather than being viewed as an end in itself?

Three implications flow from this. First, such CVETL has to be high quality – it has to deliver on promise of improving company effectiveness. This will probably involve not just learning new techniques but also expert support in how to apply them in the company. Second, other employees and employers need to become aware of the link between such an approach to CVETL and organisational effectiveness. Third, for those companies that are not interested in enriching learning-poor jobs then it should be clear that the main aim of policy interventions at this level should be in helping people overcome their present situation: that is, it should help them acquire new skills which could allow them to leave their unsatisfactory and precarious jobs and to self-design a new professional future in the same sector or even outside it.

Responding to the challenge of developing new forms of CVETL

In dynamic sectors there are signs of new forms of labour market in which the traditional dynamics of work demand/supply are replaced – although not completely – by knowledge demand/supply dynamics (Burton-Jones, 1999). Certainly within ICT case study

companies there was evidence of a logic of protection of their internal intellectual capital when they put in practice policies that – although not in a conscious way – had something to do with the idea of core competencies development, whereby internal resources assuring competitive advantage have to be continuously monitored and rewarded (Prahalad and Hamel, 1990). The high mobility which is typical of the ICT sector is not totally at odds with firm policies aimed at promoting ‘internal labour markets’ allowing more or less extended opportunities for informal work-based learning and individual competence development.

For individuals, ‘spontaneous’ learning from others and self-learning can represent powerful boosts for the acquisition of some degree of work process knowledge, but both these ways of informal learning cannot be considered as the only ways of competence development. Positive development of informal learning requires that parallel opportunities be put in place for deepening the technical-scientific underpinnings of work activities.

In terms of an overall strategic approach CVETL should reflect a broad-scope perspective on the nature of knowledge and competencies, especially in rapidly changing technology-based processes. Knowledge needed within such processes cannot be treated anymore only in terms of know-what (information about the explicit aspects of work activities) as is typical of many initiatives (courses) in this field. Dealing with such processes also requires continuously accrued competencies in terms of know-how (based on awareness of the effects of the tacit cognitive components of work activities), know-why (i.e. continuously updated understanding of the scientific principles underpinning technologies and other aspects of work activities), know-who (regarding the social side of work activities) (Lundvall, 1992; Lundvall and Borrás, 1999). This implies a new conception of CVETL interventions, in which informal learning and the different modes of conversion of explicit knowledge into tacit knowledge and vice versa could also be taken into account (Nonaka, 1994; Tomassini 2003).

In terms of development policies, those devoted to CVETL should be connected with other relevant policies aimed at promoting the overall growth of the industrial/service fabric of specific sectors and regions. This means promoting and sustaining through appropriate interventions the managerialisation of SMEs, in particular for the support of entrepreneurial competencies, considering that entrepreneurs having a technical background often lack the abilities and visions needed for carrying through solutions for complex problems at the organisational and HR level.

Competence development for technicians could be linked to concrete opportunities to participate in the creation and exchange of work process knowledge and where the combination of work-based learning and autonomous self-learning assures sound bases for further progress. The main aim of the interventions should be: (i) to deepen the contents of self-learning through updating activities based on recent disciplinary and quasi-disciplinary advances; and (ii) to increase the employees’ reflective abilities through familiarisation with appropriate methodologies (‘action methodologies’, ‘reflective practices’) to be applied at both the individual and the organisational level.

7. Implications of project findings for policy and practice in Continuing Vocational Education, Training and Learning

Implications for policy from findings from surveys and interviews

Much skill development for technical workers takes place outside formal training contexts. Much learning and development takes place while working. Additionally, it may be that it is social capital, developed through participation in work-related networks, which help individuals sustain their employability.

Certainly, in a range of contexts those individuals whose work regularly took them to other workplaces, or changed jobs frequently early in their career, developed strong networks as well as experiencing challenging work in a variety of contexts, a process that honed their skills in a number of respects, including the development of tacit skills. In some cases technical workers starting their career had high level qualifications, and what they often needed to become more effective at work was practical experience gained while working rather than formal skills or knowledge updating through formal training programmes.

Progress in work is often supported by spontaneous forms of learning in which informal work-based learning and self-managed competence development converge and both are often at least partly dependent upon the quality of support from personal networks. Indeed in some contexts in a number of countries work-based learning and competence development appeared largely to compensate – for better or for worse – for the lack of wide-scale formal CVET interventions.

The findings of the Participa investigations, comprising the survey findings and analysis of interview and focus group data, lead to the following conclusions:

- In contexts where technical work itself is challenging, then much continuing vocational learning takes place outside formal training programmes.
- There is a need for employees not only to update their technical skills but also to develop further a range of more generic skills, including planning, problem solving, communication, IT and management skills.
- Learning to become more self-directed in your approach to learning can lead to significant work-related learning.
- Use of personal networks can be an effective way to critically reflect upon work and hence can be an important source of work-related learning.
- Learning how to support the learning of others (especially for those with management and supervision responsibilities) is vital to improve the likelihood of significant learning while working.
- Learning how to organise knowledge effectively and apply it appropriately is vital for technical workers' development.

These were coupled with some ideas for recommendations for CVET policy and practice:

- The focus of strategies for skill development should be upon continuing vocational education, training and learning, rather than just upon participation in CVET per se.
- Greater attention should be given to helping employees become more effective in supporting the learning of others at work.
- There is a need to focus upon the development of hybrid skills rather than just technical skills development. Hybrid skills refer to the ability of people to harness technical skills in support of business development.
- Encouraging the spread and sharing of tacit knowledge, through a combination of individual mobility and formal and informal networks, will increase the competitiveness of companies in particular districts or sectors.
- Public training institutions should design and implement policies to promote participation in training and learning among not only the technical workers but also the owners and managers of SMEs in order to enhance both professional development and company development.
- A policy to promote self-directed learning through e-learning strategies should be developed and implemented.

Implications for policy from findings from the case studies

Value of networks being linked to major companies

In a number of contexts, particularly in England, Germany and Italy, SMEs participated in networks that were organised by or around a major manufacturer or supplier. These networks were organised around mutual learning, development and support and could be focused on innovation and development. This presents a significant challenge for CVETL policy – requiring a move away from viewing the organisation as the key unit of analysis and a focus for policy concern.

Recommendation: the focus for policy support for learning, training and development should focus more on networks and clusters rather than individual companies.

The main capabilities sought in suppliers by the lead company included consistent product quality; manufacturing flexibility; continuous improvements in production or service delivery; inter-organisational capabilities to meet increasing pressure for tight integration and co-ordination of production, product design and development. These are, par excellence, learning issues, in which technical workers have a key role to play. Changes are being driven by a desire to improve competitiveness and learning is viewed as a means to achieve this, rather than as an additional burden.

Recommendation: the focus for policy support should be upon improving organisational performance and continuous improvement – from this perspective learning, training and development are outcomes rather than inputs.

Positive response of employees to removing ‘problems’ in their ways of working

Most technical workers quickly appreciated the value of the new techniques for improving the way they worked and were willing to learn new ways of working. Issues about participation in CVETL can become a non-issue, where the focus is upon improving the job (and the activities may not be viewed as learning or training, but rather simply viewed as part of natural work activities).

Policy issue: there is an important issue here about whether (and why) we need to label explicitly all ‘learning’ that occurs in other activities.

Typically, it was much more difficult to convince managers of the benefits of continuous improvement activities, simply because they were so busy addressing more pressing issues even if these were of less strategic significance. [This relates to the issue of some managers being locked into a state of ‘skilled incompetence’ where they focus solely upon the most immediate pressing issues, even if they do this successfully.]

Policy issue: there is an issue here around organisational culture. Managers may be so focused upon a range of relatively short-term targets that it is difficult for them to focus upon learning and development that delivers benefits in the medium term and beyond.

Where individual companies or networks did try to bring about a step change in how they respond to challenges of innovation, continuous improvement and development, the appointment of particular individuals as ‘change agents’ with responsibility (and time and resources) to lead the change process was successful, provided that there was explicit support too from senior management. The involvement in the ‘change agent’ training, and the broadening of their subsequent job roles, invariably led to significant personal development for those directly involved.

Policy issue: interestingly it is the combination of different types of learning activities, some of which are grounded in ‘project-based work activities’ that delivers such a powerful learning environment and seems to have such a direct effect upon motivation and attitudes towards learning. Engagement in these types of activities often whetted the appetite of the participants for engagement in further learning and development.

The training did not just lead to individual development, as one of the key aspects of the training was the need to facilitate the learning of others when cascading the approach within the company.

Policy issue: one important feature of a mix of training and learning was that it did not just lead to individual learning and development, rather the companies now effectively had ‘learning champions’ who were keen to support the learning of others – indeed that was the raison d’être behind their role as ‘change agents’.

After involvement in training as ‘change agents’ these individuals sometimes cascaded the training and approach to development to other employees involved in production and/or technical activities. Importantly, this was one way a positive approach to learning and development was spread beyond technical workers.

Supporting learning and innovation in SMEs through participation of technical workers in continuing vocational education, training and learning: interaction between training policies and creating opportunities for significant learning experiences at work

When looking for cultural shifts in attitudes towards learning and development to become fully embedded, it is worth recalling this is a long-term process.

Policy point: Compare how it took decades for Toyota to embed institutionally a continuing commitment to continuous improvement.

The experience of case study companies in England, Germany, Greece and Italy showed how formal CVET was particularly effective when it encouraged both formal and informal learning in the workplace. One way to achieve this was to encourage a decentralised view of the processes of knowledge creation within companies. The focus upon SME skill needs could be the stimulus for organisational and inter-organisational learning and knowledge management across networks, as well as supporting individual learning.

Policy point: One implication of this approach is that it might be worthwhile considering a reshaping of the boundary between higher education (and/or senior secondary vocational education) and continuing education and training and organisational development. The underlying pedagogical idea would be that there is considerable value in attempting to link processes of knowledge creation with approaches to tackling the core problems of manufacturing practice or service delivery as a means of engaging learners (in SMEs) that have traditionally been difficult for formal education and training institutions to reach.

It is also clear that innovation and learning within organisations are essentially social processes. Hence in successful networks particular attention was given to building relationships to support innovation that went across companies in the networks. The development of key individuals or change agents was itself designed so that they would be able to support process innovations within their companies.

Policy point: This means that networks offer not only a mechanism for technology and process transfer and exchange of ideas about development and practice, but also a means of supporting those interested in acting as change agents in support of development and innovation.

Policy point: Networks, such as those exemplified in the case studies, have the potential to grow as a general means of innovation transfer in supply chains.

Networks sought to give people not only access to innovative ideas, but also to give learners opportunities to shape these ideas in ways that were directly useful to them in their work. This applied particularly to the work with company change agents.

Policy point: A major concern with the development of much learning in continuing vocational education and training that is supposed to support practice is that the knowledge generated is often decontextualised. This problem was overcome in networks that focused upon the key problems of manufacturing practice or service delivery. Attention is given to problems and dilemmas that are central to the challenges that technical (and other) workers face in the workplace.

Decontextualised knowledge may be of relatively little use to employees in coping with many of the problems they face in practice. The focus upon key problems faced in the workplace is, however, not simply linked to technical issues. The problems are likely to contain combinations of practical concerns, organisational issues and socio-cultural problems. Adopting this approach also means that employees are directly involved in processes of active knowledge creation. Additionally as much of the learning is grounded

in improving processes and practice there is little doubt that this approach can contribute to improvements in efficiency and the competitiveness of SMEs.

Policy point: More generally, what is of particular interest is the way that training policies operate within supply chain networks. That is, formal training in process improvement techniques for technical workers are being combined with creating opportunities for the application of these processes in a collaborative manner which in turn generates significant learning experiences at work.

In many cases the roles of those undergoing training were broadened, for example through participation in improvement teams, and the organisation of work itself was often changed as a direct consequence of participation in these activities.

Policy point: This is important as the creation of learning-enriched jobs leads to more embedded learning and is sustainable, compared to training that is going against the grain of what is happening at work.

The approach to learning through networking could be seen as an example of an active model of learning whereby learners are engaged in the creation of 'new contextualised' knowledge, not recipients of a largely passive process of knowledge transmission. This is in line with the theoretical framework developed to explain processes of organisational knowledge creation by Nonaka and colleagues (Nonaka & Takeuchi 1995; Nonaka & Konno 1998). This approach makes use of a social model of knowledge creation and transformation. The key process for genuine knowledge transformation to occur is that knowledge has to move from the individual level into wider communities of interaction that cross organisational boundaries as happened in networks. Learning communities, based either on multi-organisational or professional networks, worked well when they possessed the dynamism continually to create new knowledge.

Policy point: This approach to the development of practice is reflective, forward-looking and dynamic and works best within a culture that acknowledges the importance of developing practice, expertise and analytical capabilities in an inter-related way so as to be able to support the generation of new forms of knowledge.

The network approach outlined also fits well with the idea that those engaged in particular work practices and processes have a key role to play in how new knowledge is generated and applied in practice (Engeström 1994). An individual's knowledge of practice can itself be regarded as a personal synthesis of received occupational knowledge and situational understandings, derived from experimental learning, which are capable of being further transformed through a process of critical reflection. As expertise develops, and new contexts are utilised in the performance of practice, so the processes of analysis, review and reflection can lead to the creation of new forms of knowledge (Engeström 1994).

Policy point: Approaches such as those adopted in networks therefore constitute an important way in which to develop contextualised knowledge of how to affect continuing practice and process improvements. These practices and processes are dependent upon the active participation of a full range of employees, with technical workers having a particularly important contribution to make.

The role of individual agency in participating in training, learning and knowledge development at work

The benefits of participation in networks focused on improvement, learning and development to companies were evident in improved organisational effectiveness. However, what personal advantages might an individual gain from participation in networks? In relation to participation it was interesting that after participating in networks many individuals expressed an increased interest in investigating ways in which they could continue their learning.

Policy point: involvement in networks could represent a different type of learning to that previously on offer and participation in substantive programmes of CVETL could act to change the attitudes of the participants towards learning.

Policy point: Note by addressing structural factors associated with the nature of the particular provision of the combination of formal CVET and opportunities for learning at work then issues associated with individual agency as to whether or not to participate in CVET assume less significance.

Although some aspects of formal learning in networks could be formally acknowledged and/or accredited, other aspects of involvement in activities designed to bring about improvements in company performance and in their own individual learning were often not recognised. Learning could be evidenced, however, through reflections upon learning at work in portfolios. This process could be evidence of the ability to communicate effectively in writing, to be self-reflective and so on. There is value in portfolio building being coupled with active reflection upon what has been achieved with others too, rather than being a passive individual process of just documenting what you have achieved.

Supporting learning in SMEs

It is worthwhile drawing out four lessons for supporting learning in SMEs. **First, it is clear that a focus upon improving organisational performance can contribute to improving commitment to learning at work of both companies and individuals that have traditionally been hard to reach.** Examples of demonstrable improvements in quality, cost and delivery can make the link between learning and performance transparent. The support of large companies as lead organisations in a network can be significant too. The participation of large organisations in networks proved to be powerful 'hooks' to engage SMEs in learning activities.

Second, once committed and after overcoming initial suspicions of learning and working with staff from other companies, there were considerable benefits from collaborative learning. The networks involving change agents from different companies working together meant that, in addition to transfer of 'good practice', they could get a 'feel' for the capabilities of the other companies and this opened up possibilities for greater collaboration. In networks there was also value in learning as a member of a group, including from others with a variety of backgrounds - with mutual learning across hierarchical levels as well as horizontally between departments and companies.

Third, learning in networks was most effective when there was a formal learning framework in the initial stages and a continuing structure of learning support - it was not just a question of bringing people together. The use of a wide range of learning methods helped improve commitment towards learning. These methods could include: participation in process improvement reviews and implementation; workshops focused on key problems of manufacturing practice or service delivery; group discussions; formal assignments; portfolio-building; and discussions with tutors. There

could also be a key role for a mentor, coach or learning support tutor in helping learners build and then sustain commitment towards their learning goals.

Fourth, the final stage for companies is to attempt to move towards still more expansive learning beyond the immediate context and thus overcome the problem of 'skilled incompetence'. Many of the technical staff who had engaged in substantive learning through working in process improvement or project teams recognised the value (and potential transferability) of the skills they were developing and this contributed to their commitment towards learning. For example, the skills required in coping with the challenges of trying to implement change involved compromise and dialogue and helped people hone their communication skills. Working in teams and on projects often gave people support to help them engage in patterns of thought conducive to learning. However, both for individuals and companies there was also the need to have time and space to engage in critical thought, self-reflection and personal development, including opportunities for both collaborative and self-directed learning, in order to overcome the possible limitations of a focus just upon improving current processes and practices. There is also a need to consider longer-term issues.

Overall, models of learning in networks with an emphasis upon networking, knowledge creation, linking an initial focus upon performance with a progressive broadening of ideas about learning and development are particularly well suited to the development of technical workers in small companies. For the companies to engage in organisational learning, however, they need to look to beyond the stage of 'skilled incompetence' and consider more strategic issues of learning and development as well.

One implication of this approach is that it might be worthwhile considering a reshaping of the boundary between higher education, continuing education and training and organisational development. The underlying pedagogical idea is that there is considerable value in attempting to link processes of knowledge creation with approaches to tackling the core problems of manufacturing practice as a means of engaging learners (in SMEs) that have traditionally been difficult for formal education and training institutions to reach.

One key lesson from the Participa project is perhaps that well-designed provision that integrates CVET and opportunities for substantive learning in the workplace can overcome the potential reluctance of individuals in SMEs to participate in CVETL. On the other hand, such provision does require whole-hearted commitment of the company to a process of organisational development: that too represents a substantial challenge.

8. Value added of a comparative perspective from research on Continuing Vocational Education, Training and Learning

Comparative perspective: characteristics of companies with a commitment to learning and development

From a comparative perspective, the findings from all six countries show that successful companies with an explicit commitment to learning and development (for technical workers) exhibit a number of common characteristics:

- Significant learning is embedded in everyday activities because of the structuring and organisation of work

- Significant learning occurs as a result of systematic reviews of everyday performance and the problems encountered and through a commitment to collaborative resolution of those problems
- There is an expectation that technical workers will engage in self-directed learning (learning from the Internet and e-learning are becoming important in this respect)
- The focus upon embedded learning is complemented by allowing access to formal training provision too
- Workers recognise that they have a responsibility to keep professionally up-to-date (and not to do so would have negative consequences for them as well as the company)
- Learning from colleagues is explicitly encouraged and facilitated.

Comparative perspective: influences on technical workers' desire for learning and development

The comparative findings, drawing particularly on behaviour in the English, German and Italian case studies, highlight the following influences on technical workers' desire for learning and development:

- In all three countries 'learning by interacting' through interacting within communities and networks is a fundamental way for constantly re-building personal cognitive approaches both to specific issues and re-constructing the sense of the whole work experience. Technical workers were often engaged in a wide range of networks that helped with different aspects of their work-related learning and development, only some of which were explicitly linked to the organisation for which they worked. On the other hand, in some settings access to a broad set of interactions was restricted to a particular group of technicians, whose opportunities for learning as part of their everyday were consequently much richer than those whose work and contacts were more restricted.
- It was noticeable that in both personal and explicit company-linked work activities the search for knowledge was broad, going well beyond just development of technical skills. The search did incorporate aspects of technical know-how (how to apply technologies), but also involved know-what (where and when technologies and knowledge could be applied), know-who (not just in relation to customers but also an active search for people who would be valuable as members of a personal network), and know-why (a fuller understanding of phenomena and processes, including in some cases a deeper scientific understanding). This desire for sense-making could be driven by one, or a combination, of **an individual search for understanding, be embedded in occupational identities** (thereby influencing attitudes and behaviour) **or a function of participation in networks with an explicit learning dimension.**
- Technical workers seemed to be well aware that learning does not grow only 'by doing' (i.e. accumulating experience in repetitive processes) or 'by using' (i.e. gaining incremental abilities in using machines and devices of different kinds), but there were also advantages to a more systematic approach to learning and development, whether this utilised some or all of the following: the systematic exploitation of the web, participation in specialist networks, relationships with

technologically advanced customers or colleagues, more general participation in the local innovation system, or using opportunities for formal education and training.

- learning from others with acknowledged expertise is sometimes facilitated through particular activities (e.g. work shadowing), sometimes through explicit knowledge development and sharing activities and at other times is built into the organisation of work activities (e.g. in the construction of project teams). In some settings learning from others was built into the fabric of formal training arrangements, for example through apprenticeship, advanced training seminars or Master Engineering workshops.
- Collaboration was deemed to be a support in a wide range of situations, a natural environment for informal exchanges of information and knowledge, and a stimulus to enrich one's competencies. Being a member of a team and/or of a wider community of practice was almost universally valued. Indeed in the instances where individuals were trapped in low quality jobs one of their major grievances was that they had few opportunities to collaborate and this restricted further their opportunities for personal development.
- Much learning undertaken by technical workers is concerned with 'sense making' (both in relation to technical processes and work process knowledge more generally). That is, developing a 'vision' of how work process knowledge fits in their work activities and those of the company more generally is an important driver of learning. Technical workers often want to make sense of their experience of work as a whole.
- Recognising the importance of work process knowledge, many workers recognised both the importance and the limitations of informal learning and looked for a 'methodology for knowledge development' that would help them achieve a more coherent and comprehensive understanding of company activities and their own practice. This often linked to more formal education and training provision and was seen as helpful in giving a basis for continuing learning and development.
- The above could be interpreted as a desire for learning through working and interacting and self-directed learning leading to contextual understanding to be interspersed with periods of more formal learning and development that allow for more considered reflection, a linking (and integration) of what has been learned by experience and informal means, and more rounded professional and personal development.
- Guidance services might be of great help to technical workers making their way through (or even out of) their chosen field. Time and again it became clear that individuals would have appreciated some guidance and support when making decisions that were often strategically important for their own career development.
- The need of an acknowledgement of acquired competencies, even at an informal level, was strong. In some cases this was seen as a signal for evaluating how much interest the company had in your development. In this way, the offer of participation in some formal education and training offerings was appreciated (even if the provision was not necessarily that good) because it was a tangible sign of the company's health and that it valued you as an employee.

- The extent to which the work environment offered substantive opportunities for learning and development. This phenomenon can be visualised as a continuum. The 'haves' are technicians working in organisations that in some ways are 'learning organisations' where competence development is intrinsic in the functioning of work relations and supports the emergence of acknowledged professional identities and/or they have regular access to opportunities for learning and development in formal CVET provision. The 'have-nots' are operating within a low quality work environment, at risk not only in terms of job security but also exposed to more or less radical isolation from competence development and from possibilities of self-promotion through self-learning. Somewhere in between are those technical workers working in organisations where opportunities for learning and development, either through work, interaction or CVET, are unevenly distributed. In these cases managerial judgements on your organisational commitment can be critical to your opportunities for further learning and development.
- At the individual level three distinct approaches to learning and development, according to whether greatest use was made of formal CVET provision; opportunities for learning while working; or self-directed learning.
- When learning experiences were very rich it was striking the range of learning opportunities that could be undertaken. They included learning while working in a job with considerable challenges; learning through working with someone with acknowledged expertise; learning through working in multi-disciplinary teams; learning through organised reflection and review; learning through the application of knowledge learned in CVT to work activities; learning through working with suppliers; learning through exposure to other working environments; learning by doing without any formal training (e.g. through giving presentations).
- Individuals learn what type of learning will be useful to share with colleagues, and they also learn about where and from whom further knowledge could be gained.

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