Changing patterns of youth training and the business process : a European perspective

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1. Introduction

One of the central concerns of vocational education and training (VET) professionals in Europe in the late 1990s has been how to support those undertaking VET programmes such that not only can they perform more effectively in their jobs as they exist today, but also so that they are better equipped to handle changes in what they will be required to do in future. The trend has been towards looking for how to develop flexibility in trainees and workers such that they are able to cope more effectively with change and be more oriented towards what they may be required to do in the future, rather than simply training for existing jobs. These concerns relate both to initial education and training and continuing vocational education and training. In a discussion of the interactions between changing patterns of youth training and changing business processes, it seems as though there are two essential developmental tasks young entrants have to be able to do if they are to function effectively in dynamic companies which are operating in knowledge-intensive environments. First, they need to be able to transfer what they have learned in other contexts to their new working environment. Second they need to engage in knowledge development in and on behalf of their companies. Both these processes warrant further investigation as neither process is unproblematic. This paper will therefore focus upon issues of transferability and knowledge development and the implications of supporting the development of these both within work and initial and continuing vocational education and training.

2. Context

In the light of the economic upheavals and social change of the last twenty five years and ongoing profound technological and structural changes in labour markets and work processes, qualifications for lifelong learning have become a 'conditio sine qua non' and are regarded as core skills of individuals in order to enable them to have a better chance to develop and maintain their career (European Commission 1995a). This has led to an increasing focus on vocational education and training in the member states. Vocational education and training is central because the structures, agencies and processes of school to work transition are crucial for the development of qualifications for, and a positive attitude towards, lifelong learning.

Changing contexts and arrangements of learning between education, training and employment can be a powerful means to develop transferable key skills, the ability to transfer skills, knowledge and understanding, and a sense of significant skill ownership. Within VET programmes therefore there has been increasing attention paid towards developing orientations towards flexibility, change and the future, rather than simply training for existing jobs. This has led to the development of the concept of lifelong learning and placed increasing focus on the relationship between school to work transition and continuing training as underpinning the development of skilled work for flexibility, innovation and the creation of enterprises and jobs.

Additionally because of the uncertainties of the future European labour market, even a successful transition from school to work will often not result in permanent employment as an experienced skilled worker in one occupation. Rather, occupational mobility and flexibility will become of increasing importance for individuals as well as for organisations. Therefore a positive attitude towards lifelong learning will become more and more part of occupational identity, such that methods and approaches used in educational systems will have to be developed in order to foster the interaction between learning for and at work and within and across different sectors of education in an integrated and iterative way.

Existing European Commission funded programmes and projects are looking at the different routes open to young people after the age of 16 and are developing and piloting qualifications with a dual orientation towards employment and continuing education and training in the different partner countries (Brown and Manning 1998). However, there is a need to go further and examine the dynamic processes at play and to develop models of good practice for enhancing the efficiency of the acquisition of qualifications for lifelong learning in order to inform policy development at national and international levels. This paper is based on a Socrates Study and Analysis project on 'Effective Processes for the Acquisition of Qualifications for Lifelong Learning' (LIFEQUAL) which has been designed with just such an intention.

3. Promotion of transferability

Because many jobs are becoming more complex through task integration, this puts a premium upon the ability to transfer knowledge and skills to different situations (not least so as to reduce the learning time). Research highlights the importance of learners developing mental maps (Soden 1993), so as to be able to organise what they have learned, with the increased possibility that they could then apply this elsewhere.

Transfer though tends to be highly specific and it needs to be **guided**: it rarely occurs spontaneously. Perkins and Salomon (1989), in their review of research on transfer, argue transfer is possible, depending upon how knowledge and skills have been learned and how the individual deals with that knowledge in different contexts, and that two conditions are generally required for transfer to take place: context-specific knowledge and general skills have to be brought together and the approach to learning needs actively to seek ways to encourage transfer.

If one intention of a learning programme is to help learners develop the ability to transfer skills, knowledge and understanding, then learning contexts are required which draw attention to the significance of skill transfer. For example, this could involve actively helping people to look for opportunities to transfer skills, knowledge and experience and giving them opportunities to practise making successful transfers (Blagg et al 1992). Exposure to a **range** of contexts then can be valuable both for the way it can enhance and lead to a more complete ownership of a skill (Hayes et al 1983) and because it allows learners to make connections (and think about transfer) between contexts (FEU 1984).

Pea (1987) argues that it is necessary to promote a transfer culture, and this would include organising an affective climate directed at transfer. Hence attempts should be made to make transfer strongly linked to learner motivation and commitment. The whole thrust of this approach then is that learners in particular, but also trainers and tutors, are encouraged to analyse contexts for the possibility of skill transfer. Those supporting learners, particularly in the workplace, have to want to support skill transfer and there is evidence that this condition was often not met in the past (FEU 1985).

Hayes (1992) highlights the potential for simulations or extended project work to integrate a number of strands of learning and to seek to promote the ability to transfer from that base. The requirement that learners integrate a broad range of experiences, besides having the capacity to develop the ability to transfer, can itself also help in the development of learners' critical thinking and conceptual skills (Winter et al 1981). This does though depend upon learners being given opportunities for reflection so as to broaden the generality of skills and knowledge learned (Hammond and Collins, 1991).

A recent documents on the need to promote transferability in learning programmes comes from Tim Oates of the Qualifications and Curriculum Authority (QCA). In a "Key Skills Strategy Paper" Oates (1998) argues that the current specifications of key skills in GNVQ and other programmes have certain benefits, but that they do not engage with the issue of how to design learning programmes such that individuals are able to transfer what they have learned to new contexts. Oates highlights the value of the development in learners of adaptability "the transformation of existing skills and knowledge in order to perform effectively in unfamiliar tasks" (Oates, 1998, p1). Note that what Oates terms adaptability could be broadly regarded as what is termed transferability in the context of European debates about these issues (Nijhof and Streumer, 1994). The key elements of the Oates argument are as follows:

- "the promotion of `true transfer' may best be secured by implementing a record of achievement for continuous recording of the way in which a key skill has been deployed and redeployed across an increasing range of contexts.....adaptability - throughout lifelong learning - is best promoted not by a drive towards attaining units, but by continuous review of application of skills in varying contexts. Recording of achievement processes, supported by structured review and tutoring support may be the best vehicle to promote this in all phases. The achievement of vocational and academic qualifications would be an outcome of these processes directed at adaptability, rather than adaptability itself being the focus of `hard' certification" (Oates, 1998, p3).

- "skill transfer can break down unpredictably from person to person.....it seems to be down to the strategies which people use in coping with unfamiliar problems - the skills of transfer, and not just the possession of transferable skills.....we must recognise that summary assessment and certification of key skills or transferable skills is necessary, but insufficient. This needs to be supplemented by processes which encourage learners to analyse the way in which they are acquiring key skills, in analysing the links between activities they have undertaken in the past and the demands of new activities, and target-setting using frameworks of key/transferable skills. However, it is probable that normal assessment and certification

processes are unlikely to sensitively discriminate the `surface' learning from the `deep' learning effects. In consequence the argument that urgent attention be paid to the shape of *learning programmes* is a message UK education and training could do well to heed" (Oates, 1998, pp 6-7, emphasis in the original).

- the strongest evidence on the value of this approach comes from a project on Cognitive Acceleration in Science Education (CASE) by Adey and Yates (1990). Students taking part in this initiative achieved higher grades not only in science subjects but also in subjects in which there had been no intervention. The curricular approach focused upon the following:

  1. **cognitive conflict -** students had to `struggle' with intellectually challenging problems. This approach required greater coherence in structuring learning situations, and the challenge had to be such that it could support learner development , without demoralising the learner through constant failure;
  2. **reflection** - learners were explicitly encouraged to think about and reflect upon their own thinking processes;
  3. **bridging** - learners were encouraged to adopt a conscious approach to transfer, in that they were encouraged to apply existing strategies to new tasks or situations;
  4. **reasoning patterns** - these were not taught directly, but teachers who were aware of these were "better equipped to help pupils develop the reasoning patterns for themselves" (Adey and Yates, 1990, p2).

- Oates also highlights how problem-solving approaches in maths have yielded enhanced performance in the application of skills through stimulation of enquiry in unfamiliar settings (Boaler, 1996). Medical training is also quoted as an area which has been effective in securing skill transfer. Although Oates refers to evidence of skill transfer in medical training from the USA and New Zealand (Newble and Clarke, 1986), problem-solving approaches are now almost universal in the early stages of medical training in the UK and these have had marked effects on motivation and resulted in significant reductions in drop-out compared to the more traditional academic approaches previously used. These approaches also utilise a careful sequencing of theory and practice, focus upon learning styles and deliberate use of a wide range of learning styles (Newble and Clarke, 1985).

- Oates goes on to argue that although "the precise details of the models vary.....they share a common theory-driven pedagogy, focusing on principles of fostering autonomous redeployment of skills, through learning programmes where difference in context is managed carefully as a key aspect of the learning programme.....the crucial component therefore seems to be the following: pedagogy and programme management driven by a coherent model of skill transfer, not the simple implementation of a list of key skills" (Oates, 1998, p24).

4. Continuing development of skills and knowledge: importance of knowledge development in dynamic organisations

4.1 Increasing demands for skills, knowledge and understanding

In recent European white papers (for example, European Commission 1995b) skills and knowledge are viewed as integral to the promotion and maintenance of individual employability. Thus European policy stresses the importance of individuals taking responsibility not only for the acquisition of initial education and training but for maintaining that knowledge through their working life. Skills and knowledge are also seen as central to the development of social citizenship through informed participation in democratic decision making. The introduction of new technologies and associated knowledge demands are seen as requiring continuous learning as a basis for effective participation both at work and in the wider community.

Vocational education and training is increasingly putting an emphasis upon the need to develop flexibility and adaptability of individuals (Nijhof 1998, Oates, 1998). Workers are perceived to need to be able to adapt to new skills and processes and to update their knowledge on a regular basis. Skilled work increasingly requires the ability to deal with unpredictable occurrences. Even within the highly regulated German system there is a tendency towards the adoption of far broader occupational profiles than the narrow boundaries of skills and knowledge application associated with Taylorist forms of work organisation. New forms of work organisation place a priority on communication skills and on the ability to work in teams. The new information and communication technology industries in particular are demanding higher levels of skills and qualifications. Furthermore the demand for the continuous updating of skills and knowledge for lifelong learning itself imposes new qualification requirements relating to the necessity of 'learning how to learn'. Gerald Heidegger (1997) argues that it is not enough for skilled workers to be able to respond to the changing requirements of our society. Instead they need the skills and knowledge to be able themselves to shape the application of technology and the social form of work. Heidegger (1997) believes there is a dialectical relationship between education, technology and work.

The cognitive side of occupational competence is key to the development of context-related expertise: with work-related knowledge providing the link between knowledge, which is not context related, and experience at work, which may not necessarily be used in a generalisable way. This implies both the need for active reflection upon experience and a shift from information to knowledge: expertise cannot be developed through simple although extended information acquisitions, but only through continuous and subtle cognitive experiences related to putting knowledge into action, co-developing personal and professional knowledge, and integrating individual knowledge into the larger dimensions of knowledge held by groups and whole organisations.

4.2 Knowledge development as a key factor in innovation

The focus upon particular kinds of knowledge development has been identified as a key factor in innovations designed to increase the supply of creative knowledge value: "what is important for the production of knowledge value is not so much facilities or equipment in the material sense, but the knowledge, experience, and sensitivity to be found among those engaged in its creation" (Sakaiya, 1991, p270). This way, knowledge is assumed as the real driving force of our era, but also strictly linked with day-to-day problem-solving and problem-setting in working situations, and more generally with the professional competencies and expertise. When thinking about

knowledge development it may be useful to distinguish between different types of knowledge. Lundvall and Johnson (1994) identify four different kinds of knowledge, each requiring different types of mastery: know-what, know-why, know-how, and know-who.

Know-what refers to knowledge about `facts': it can be considered as equivalent to what is normally called information and is related to the knowledge `corpus' that each category of experts must possess. Know-why refers to scientific knowledge, influencing technological development and the pace and characteristics of its applications in industries of every kind. Also in this case, knowledge production and reproduction take place within organised processes, such as university teaching, scientific research, specialised personnel recruiting, and so on.

Know-how refers to skills - that is, the capabilities to do something in different contexts (e.g. judging the market prospects for a new product, operating a machine-tool, etc.). Of course know-how is typically a kind of knowledge developed at the individual level, but its importance is evident also if one considers the division of labour and degree of co-operation taking place within organisations and even at the inter-organisational level (for instance, the formation of industrial networks is largely due to the need for firms to be able to share and combine elements of know-how). Know-who is another kind of knowledge which is becoming increasingly important, referring to a mix of different kinds of skills, in particular the social skills, allowing the access and use of knowledge possessed by someone else, often through a combination of professional and personal networks (Eraut et al 1998).

A typology of different kinds of knowledge, akin in many ways to the one mentioned above, has been developed by Vickstroem and Normann (1994) in their attempt to develop a new perspective of corporate transformation. They distinguish: information, skill (or know-how), explanation, and understanding.

Information is a piece of knowledge of an objective kind whose importance is mainly related to its `factual' nature but is not limited to that. For instance, the addition of new information about a certain topic can modify the pattern in which this topic was conceived letting a new intellectual structure emerge. Skill or know-how, unlike information, is embedded in individuals, as they are able to behave coherently in a particular situation in order to achieve a certain result. Much knowledge of this kind is often referred to as tacit knowledge, acquired through watching what other people do and by trial and error.

Explanation refers to scientific knowledge, it is not person-based and can be found in articles, textbooks, and so on. Explanatory knowledge very often provides the basis for problem-solving activities. Understanding is the most profound form of knowledge, arising when principles and connections are recognised. Understanding is thus embedded in individuals and is in many ways equivalent to learning, insofar as it involves the creation of new knowledge.

Each kind of knowledge is characterised by different channels through which learning takes place. The easiest cases are those of know-what and know-why, that can be obtained through the typical channels of knowledge acquisition (reading books, attending lectures, accessing data bases), while the other two categories are rooted primarily in practical experience and are more

problematic insofar as they require the availability of informal social channels. They are also the types of knowledge upon which dynamic organisations depend and companies are particularly interested in whether new recruits will be able to contribute to the creation and development of such forms of knowledge.

Apprenticeship and other forms of VET which involve on the job learning are fundamental channels for acquiring know-how knowledge: they represent the most important way for skilling newcomers in an organisation, but these protracted processes of learning by doing are also frequently the responsibility of those who are considered the experts in an organisation, capable of above-average performance. Simulations are sometimes used as shortcuts for reproducing the many aspects of the know-how acquisition available in real situations. Know-who too - as Lundvall and Johnson (1994) point out - is socially embedded knowledge which cannot easily be transferred through formal channels of information. It is learned in social practices and through participation in particular networks (like those taking place in the professional communities giving the participants access to information bartering with professional colleagues), although some of it can be learned in specialised educational environments.

4.3 Work-related knowledge

Work-related knowledge is to some extent quite difficult to pin down for two reasons. First, it contains a tacit dimension and, second, it is bound up with particular social contexts: that is, work-related knowledge is applied within particular communities of practice, whose members develop ideas about how knowledge should be acquired, applied and shared.

The tacit dimension of knowledge was originally proposed by Michael Polanyi (1962). The basic idea is that "we can know more than we can tell." That is, there is a level of knowledge that cannot always be put into words and linearly explained. In this dimension, in which the concepts of know-how, skill, competence, and expertise are rooted, knowledge is a practical and theoretical ensemble, whose development and mastery take place through procedures which cannot be identified in linear terms. In fact, the results of cognitive processes are often obtained only by successive approximations. The acquisition of specific elements of knowledge that we possess, but are unable to express, comes about, in many cases, by focusing our attention on further elements and by successive feed-back on what we have previously learned. The discovery (or acquisition) is facilitated by anticipating the implications that are yet to be determined. In this way, knowledge accumulated in a cognitive system, although not expressed, makes up an implicit framework orientating the ways in which successively other elements enter the system. This is the reason why individual skills are usually tacit: "the aim of a skilful performance is achieved by the observation of a set of rules which are not known as such by the person following them" (Polanyi 1962, p.49).

The social nature of work-related knowledge has been underlined by drawing attention to the social context in which knowledge is acquired, developed and applied. The most relevant part of knowledge is seen in terms of interpretation of experience, based on idiosyncratic frameworks that at the same time favour and limit the individual process of sense-making (Resnick, 1991). Situated cognition, the situation in which cognitive acts take place, is the driving idea of this kind

of approach, recognising that individuals are very sensitive to their cultural context. The latter provides a complex fabric of references (exchange of information, attention to events, co-operation, etc.) that in the long run give shape to individual knowledge and determine a social construction of knowledge. Understood this way, the context creates a dynamic equilibrium between the know-what of theory, and the know-how of practice. In fact, it is through the tight inter-dependence, or better the co-production of theoretical knowledge and practical knowledge (Brown et al, 1989), that competencies can be developed and maintained.

The social nature of work-related knowledge is also stressed in the cultural-anthropological perspective. For instance, Orr (1993) analysing the working behaviour of work groups for repairing photocopiers, shows that these technicians develop their knowledge over time through problem-solving and continuous interaction. The defects of the machines they have to cope with are often very different to the ones reported in the standard operating manuals, therefore problem-solving and problem-setting happen collectively on the basis of previous experiences of each member of the group and on the basis of various types of communication, even the informal chatting around the coffee-machine. This way, knowledge is continuously created and maintained within a specific community of practice, having its own language and myths (partly through the handing down of war stories, reporting the main events of machine repairing and client dealing).

Recently ideas about the application of tacit knowledge in particular social contexts have been developed further in considering moves to create 'knowledge-creating companies' (Nonaka & Takeuchi, 1995). The model is based on the assumption that knowledge in organisations, especially in the most innovative enterprises, is created through the interaction between tacit and explicit knowledge, continuously `converting' one into the other one. The model postulated four different modes of knowledge conversion called socialisation (from tacit knowledge to tacit knowledge), externalisation (from tacit knowledge to explicit knowledge), combination (from explicit knowledge to explicit knowledge), and internalisation (from explicit knowledge to tacit knowledge).

Socialisation is a process of sharing experiences and thereby creating tacit knowledge, such as shared mental models about the application of technical skills. This occurs in the particular case of on the job learning during apprenticeship, in which tacit knowledge directly derives from the master - not through language but through observation, imitation, and practice - and is converted into the tacit knowledge of the apprentice. It is a process which cannot be abstracted from associated emotions and from the specific contexts in which shared experiences are embedded.

Externalisation is a process of articulating tacit knowledge into explicit concepts. It is generally based on metaphors, analogies, hypotheses, images or models from which new ideas and products can be generated through interaction between individuals who want to reach the same outcome. It is in a process which facilitates concept creation combining different reasoning methods (deduction and induction).

Combination is a process of systematising concepts into a knowledge system, through combining different bodies of explicit knowledge. The media for this purpose can be very different

(documents, meetings, telephone conversations, computerised databases, and so on). Reconfiguration of existing information through sorting, adding, combining, and categorising explicit knowledge can lead to new knowledge.

Internalisation is the process of embodying explicit knowledge into tacit knowledge. It is closely related to learning by doing: that is, the sum of experiences gained by individuals through socialisation, externalisation, and combination can become individuals' tacit knowledge bases in the form of shared mental models or technical know-how. But internalisation can be also reached through other forms: for instance reading or listening to success stories can induce new levels of tacit knowledge in the members of the same organisation and the establishment of new shared mental models within the organisational culture.

The four modes of knowledge conversion are structurally interconnected. Different events of organisational life can be viewed from a perspective of incorporating each of these modes in the processes of knowledge creation. Of course an organisation cannot create knowledge by itself but can only mobilise tacit knowledge created and accumulated at the individual level. Tacit knowledge of individuals is the basis of organisational knowledge creation `organisationally' amplified through the four modes of knowledge conversion. Nonaka and Takeuchi (1995) define this process as the `knowledge spiral' in which the interaction between tacit and explicit knowledge will become larger in scale as the relationships among the four modes are continuously increased and managed.

In this perspective, organisational knowledge creation, which could be considered a subtler way of viewing organisational learning, is a spiral process, starting at the individual level and moving up through expanding `communities of interaction', that crosses sectional, departmental, divisional, and organisational boundaries in the organisation. Overall then, work-related knowledge appears as a very complex and multifaceted issue, involving several different and sometimes contradictory dimensions, which can be synthesised in the relationships between explicit and tacit knowledge. Organisations, with business processes highly dependent upon the continuing development of work-related knowledge, are therefore particularly interested in whether new recruits will be able to make substantive contributions to the creation and development of work-related knowledge. This perspective has clear implications for the relationships and interaction between initial education, work, continuing vocational training and lifelong learning.

5. Implications for vocational education and training of a greater emphasis upon transferability and knowledge creation in work

5.1 Learning to learn

The pace of change in many aspects of work and the work environment put a premium upon the ability to learn. Learning to learn is seen as fundamental if workers are to be able to adjust to changes in organisational structures, technological innovation and almost constant change to work processes. One key attribute, associated with initial skills development, which needs to be

developed is the ability `to pick up the threads' in future when skills need updating (Brown et al 1991). That is, young people need to be confident about their ability to learn in future.

There is almost universal recognition then of the value of learners learning how to learn (Novak and Gowin 1984), and this can give a basis for continuing learning in the workplace. As a consequence getting learners to learn how to learn is often given as an aim in programmes of initial vocational education and training. However, this does not ensure the issue will be addressed in practice (Evans et al 1987). This is because of the historic problem associated with many education and training programmes of the tendency to focus upon those tasks that are easier to teach and/or assess (Sockett 1980). Conversely, the development of more general skills, including learning to learn, which underpin much activity in education, training and employment, can be seen as the responsibility of everyone, and hence in practice of no-one in particular.

`Learning to learn' can be linked to the inculcation of habits such as systematic observation, analysis and a questioning attitude (Annett and Sparrow 1985). This is important especially if learners are to take advantage of opportunities for learning outside formal education and training settings. This links to the need not only to embed the development of learning strategies within an occupational context (Soden 1993), but that the application of learning strategies should also be contextualised. People need to learn how to apply effective learning strategies in a variety of contexts, particularly if they are likely at some stage to be in contexts where there are considerable demands to learn while working.

5.2 Reflection

There is a need to create and sustain a culture within organisations which values learning and development, and reflection can be an important process to help achieve this (Brown and Evans 1994). Any individuals with an ability to transfer what they have learned between contexts will need to be reflective both of their own practice and their own learning. Attempts should be made within VET to ensure learners will be able to reflect upon their working practices: ideally so they can set up spirals where what is **learned** from reflection on practice can inform action, thereby leading to further learning and so on (Winter 1991). While the need for any learning programme to seek to develop a reflexiveness among learners should be readily apparent, an emphasis on reflection can also act to draw attention away from concerns with the acquisition of a fixed body of knowledge or a set of immutable competencies: practice itself should always be seen as **developing**.

Hence it will be necessary for individuals to be able to continue to build and refine their own base of knowledge and understanding through reflection on practice, building a spiral of action and appreciation, leading to reflection-in-action (Schön 1983). Critical reflection on experience then is seen as a motor for learning at work (Kolb 1984, Schön 1987). The staged model of skill acquisition of Dreyfus and Dreyfus (1980) identifies the key to successful progression through to the expert stage as the processes of review and critical reflection. Critical reflection then is widely recognised as pivotal (Hammond and Collins 1991; Tomlinson and Kilner 1991) to the development of expertise

5.3 Development of thinking skills

Just as policy-makers have been acknowledging the importance of developing in learners learning to learn skills, so increasing interest has been expressed about thinking and problem solving skills development. Blagg et al (1993) conclude from a fairly comprehensive review of the evidence that enhancing thinking skills can have positive transfer effects. One highly influential text (Collins et al 1989) has put forward the notion of a cognitive apprenticeship, where explicit attention is given to the development of cognitive skills. Emphasis is given to modelling approaches to thinking when tackling problems within a domain, through demonstrations, coupled with coaching, offering hints and regular feedback when learners tackle problems themselves.

Collins et al (1989) also highlight the importance of learners making their thinking processes explicit, including through the use of articulation, whereby learners articulate the knowledge, reasoning or problem solving processes they are using. The sharing of ideas about thinking processes can be a valuable means of learning for learner and coach (Brown et al 1994). However, such sharing can also be valuable in group settings, where learners can access (develop, organise and become aware of) their own and others' knowledge and approaches to problems (Prawat 1989).

Soden (1993) argues that there is particular value in teaching and making explicit the thinking that occurs in solving problems in occupational contexts, as "good problem solvers have internal representations of fundamental principles relevant to their occupational area and these representations are connected to each other and to broader relevant knowledge in ways which facilitate application to problems" (Soden 1993, p 12).

Rissland (1985) believes it is therefore essential for tutors to create a framework that can help learners organise their learning in the domain in which they are working. Learners need to develop schemas to organise what they are learning, particularly if training is exploration-based, not least in order to be able to transfer what they have learned (Hesketh et al 1989). One important aim then for developing expertise should be to get learners to build integrated knowledge representations (Landa 1984). Teaching should then "have a dual focus - the development of the thinking skills as well as the achievement of the targeted competence" (Soden 1993, p 3).

Soden (1993) also signals the usefulness of getting students to engage in concept mapping. This is compatible with earlier research (Schmeck 1988) showing that those with a deep learning style were likely to organise ideas into networks, which linked concepts. Soden (1993) was involved in a project to get tutors to teach thinking skills to groups of learners taking vocational modules in Scottish programmes of initial vocational education and training. The work demonstrated the potential of the approach and that learners' problem solving performance could be enhanced. However, there are a number of issues, which would be likely to act as barriers to greater take-up and usage of the approach:

- current assessment processes (and administrative requirements) favouring assessment of particular outcomes (or elements) may be a disincentive for learners to attempt to **integrate** all the underlying knowledge

- the approach would be very much more effective if taught across a whole programme rather than just parts of it
- perceptions of colleagues and senior staff that they [tutors] were "wasting time when they were helping learners to practise thinking skills rather than `practical' skills, [even though] this perception was not supported by the project data" (Soden 1993, p 43)
- the method works best when extensive use is made of small group discussions and individual tutor-learner dialogues: it could be jeopardised if a tutor has to work with increasingly large groups
- whether the development of problem solving skills is valued.

Learners, therefore, need not just to learn efficient mental processes, but also need to learn when and how to use them in practice. There is, therefore, an emerging consensus on the value of teaching thinking skills to aid problem solving performance in particular contexts. This teaching though should be embedded: that is, directly linked to solving problems that occur in a particular occupational context. Learners should also be encouraged to articulate their thinking processes and be given opportunities to practise using and reflecting upon the relational networks they are developing.

5.4 Development of learner independence

What the above examples reinforce is that while greater learner independence might be increasingly required as an outcome of programmes designed to promote transferability (BT 1993), it may be necessary to pay attention to the development of learners' thinking and learning skills if they are to become independent learners. Given this proviso, however, great benefit can be gained from the learner being more in control of her or his own learning (Long 1990; Hammond and Collins 1991). One study of Training for Skill Ownership (Hayes et al 1983) in England and Wales advocated setting up learning programmes, which made maximum use of trainees learning how to `find out'. They highlighted the need for skill ownership to be re-oriented from the organisation to individuals. Companies too have been paying attention to the need to develop learner independence within programmes of work-based learning. One role for trainers is to ensure there are opportunities for reflection within such programmes so that individuals become more effective at acquiring methods of self-learning and techniques for individual development (Infelise 1994).

5.4 Teamwork and collaborative learning

Changing skill mixes and the development of multi-skilled or interdisciplinary teams may require skilled workers to work more intensively with others (BT 1993). Hence being able to operate as a member of a team is becoming increasingly important at work, and the support of others at work can frequently be decisive in the learning of individuals. Infelise (1994) highlights how large companies in France, Germany, Britain and Italy make use of group-based project work, action learning and learning while working in organised work-based learning programmes. There are increasing examples of where, because learners were working in teams at the workplace, these teams became a focus of support for learning (Infelise 1994; Dankbaar 1995). Knasel and Meed (1994) suggest the value of supportive teams in their support and encouragement of learners relates to the ways:

- they provide opportunities for people to share their skills and experience;
- they provide a forum for exchanging information and generating ideas;
- within a supportive team people can more readily give each other advice, guidance and feedback in an unthreatening manner;
- above all a team - with its defined membership, shared sense of purpose, consciousness of being a group and interdependence - can offer the kind of enjoyable, rewarding environment in which learning is more likely to happen" (p 45).

The extent to which this is feasible though depends either on how work is structured at the workplace (Pettigrew et al 1990; Keep and Mayhew 1994) or upon a readiness to set up activities for learners to learn and work **as a group.** Encouragement of co-operative learning can be seen as an important strategy for tutors or mentors to adopt, and it is important that learners should learn to value collaborative learning and working relationships and recognise the value of the experience of others. Sanches (1992) points to the way that group-based problem solving can help learners develop reflective thinking skills and their capacity for self-regulation, as well as increasing the likelihood that they will transfer what they have learned.

The value of group projects in developing the skills of working with others has been demonstrated in a number of contexts (FEU 1985; Boud et al 1991), but the problem is that time for group reflection may be seen as `soft' and be sacrificed or severely curtailed in response to more pressing demands. Soden (1993) highlights that the most effective way of "remedying thinking errors is to discuss them with someone else" (p 18). Miyake (1986) also showed that during collaborative problem solving individuals were more likely to monitor their own thinking processes. Opportunities for working with others should be built into all learning programmes but, where relatively little working and learning with others occurs at work, it may be that the use of action plans and learning contracts can give particular emphasis to supporting opportunities for working with others in other contexts.

The social context created by a co-operative approach can also enhance the motivation and commitment of the learners (Slavin 1983). Blagg et al (1994) see guided groupwork as invaluable not only to develop teamwork skills, but also as: "an important means of extending learning and understanding. Effective groups providing a `cognitive scaffold' for others to climb and build on. Ideas, tactics and solutions, evolve in an iterative way enabling individuals to see possibilities which would otherwise have been unavailable to them" (p 9). In this way collaborative learning can not only help individuals to transfer their skills, knowledge and understanding between contexts, but also expose individuals to different strategies for making these connections.

5.5 Integration of knowledge development with work-related activities

What is now required are more imaginative ways of **integrating** knowledge acquisition, problem-solving and key skills development in work-related activities, which are relevant to the workplace and meaningful for the learner (Achtenhagen 1994). Achtenhagen (1994) and Hayes (1992) argue strongly that extended `company' simulations can deliver such integration. They argue that such simulations have the potential for helping learners engage in a broader `systems thinking'. In this

respect, there would appear to be some strong alignments with the development of problem-based learning (Boud and Feletti 1991; Oates, 1998): it is learner-centred with the integration of subjects and skills into thematic blocks, coupled with use of learning oriented work in small groups and self-directed learning. Such methods would also be compatible with assessment processes that tested knowledge generated from an analysis of practice (Atkins et al 1993).

This approach would accord with the other aims espoused in this paper: the need for learners to develop thinking skills, critical reflection, the ability to transfer and so on as a basis for high level performance in future as well as at present. Such an approach, however, needs to be aligned with practical and active work-based learning, concerned with current and future performance in an holistic approach to the development of capability and expertise. This in turn will require a more integrated and imaginative concern for learning and assessment, drawing on, for example, group project work and problem-based learning and assessment.

5.6 Effective work-based learning

In previous sections the need to design learning programmes in order to develop transferability has been emphasised. However, such programmes can take place in a variety of contexts, so it is worth examining what type and combinations of learning contexts contribute to making work-based learning effective. One key decision will be the location of and balance between development of more specialised expertise and broader vocationally oriented knowledge. The diversity both of employers and of facilities of off-the-job learning providers make it unwise to lay down any general rule, as, for example, Frietman (1990) shows that either simulation or authentic learning can be effective, and which is more appropriate depends on a variety of circumstances.

Nieuwenhuis (1991) goes further to argue that there is not a single `best' context, because effective training can make use of a **variety** of contexts. Rather it may be more appropriate to audit the learning opportunities available and the advantages and disadvantages associated with particular combinations of education, training, employment and community contexts. Knasel and Meed (1994) argue along similar lines that guidance should be given to practitioners which allows them "to make informed decisions about the relative strengths and limitations of off-the-job, near-the-job and on-the-job experiences in relation to specific areas of learning and aspects of the learning process" (p iii). It is also important to monitor what happens in practice, as "work-based learning has the capacity to deliver an exceptionally challenging and rewarding learning environment. However, it can also produce sterility, where challenges are few and a series of mundane experiences lead to little learning" (Brown 1992, p 134).

Onstenk (1994) points to the need for workplaces to offer 'strong learning environments', where it is possible for learners to apply their developing skills, knowledge and understanding in different contexts. There are some obvious difficulties for some small companies in providing the full range of learning opportunities required for the development of a broad occupational competence. Training practitioners in one study in England strongly believed that organisational culture itself could be influential, whereby "the *wrong* organisational culture would significantly inhibit effective learning" (Knasel and Meed 1994, p 17, original emphasis). In contrast, in an organisation with a long-standing commitment to learning, then it may appear natural that workers learn with the

company (Brown and Evans 1994). Pettigrew et al (1988) saw the existence of receptive or non-receptive training contexts as influential upon the whole approach companies adopted to the development and management of their human resources.

While some small companies are reluctant to get involved in training and development (Keep and Mayhew 1994), other relatively small or medium-sized enterprises are highly innovative, and particularly if linked into `multi-firm networking processes' (Rothwell 1993), they can offer very rich learning environments. In such circumstances, work itself (and the survival of the company) is concerned "with extending levels of organisational adaptability and flexibility and with developing new areas of knowledge and technological competence" (Rhodes and Wield 1994, p168). The richness of the work/learning environment is such that knowledge and expertise rapidly develop through work, which is itself taking place in different contexts (and possibly companies). In such circumstances great emphasis is given to possession of: "a broad mix of skills is required to achieve viable levels of flexibility in the development and delivery of products and services, and to sustain viable inter-firm networks" (ibid, p 169).

The problem is that as Keep and Mayhew (1994) argue in many areas of the UK employers have a low demand for skills, and as a result opportunities for the development of transferability may also be limited. So attention needs to be focused not only upon the possibilities for learning associated with particular activities or jobs, but also upon the extent to which the organisation itself demonstrates a commitment to learning through its culture (Brown and Evans 1994; Pettigrew et al 1990).

It is interesting to note the considerable expectations small growing companies in central London had of new employees being able to learn while working from the outset. Rajan et al (1997) point out, in a survey of 950 small and medium-sized companies in central London, that growing companies were likely to be moving towards a performance-driven business culture, with an emphasis upon empowerment, teamwork, lifelong learning and individuals managing their own careers. Graduates were “reckoned to have intellectual and behavioural traits more in tune with the main elements of the new culture” (Rajan et al, 1997, p 13), and as a consequence “the growing companies in our sample have been recruiting a significant number of graduates in recent years .... in nearly three out of every five companies in our sample, more than 20 per cent of the workforce have graduate qualifications” (Rajan et al, 1997, p 13). The training methods most frequently used with new graduate recruits were learning by doing; coaching by line managers; interacting with suppliers and customers; and carrying out significant work responsibilities.

These dominant methods make use of mentoring and experiential learning: “graduates are thrown in at the deep end from the outset; with much of the training coming through learning by doing ....Except in professions like accountancy, chartered surveying and law, the learning that occurs is neither accredited nor examined. Even with external courses, the tendency is to send graduates on ad hoc courses that are short and modular. They address the practical needs of the job rather than the qualifications aspirations of the individual. .... Learning through external courses is actively encouraged, so long as most of it is in the individual’s own time” (Rajan et al, 1997, p 24).

While the central London labour market may be a special case in some respects, the development of skills through the exercise of responsibility, rather than through an organised preparation for responsibility, is probably typical of the wider UK labour market. Employers following this path could be regarded as developing the additional qualifications of individuals, including at a level above that of the 'skilled worker', even though these qualifications may not be formally recognised. That is these developments may be placed primarily within the 'organisational' space of company activities rather than within the formal 'qualificational' space (Brown, 1998), although there may be some variation according to the different approaches adopted by different individuals, companies or sectors. Indeed the employment of inexperienced 'over-qualified' young people (for example, graduates without appropriate specialist knowledge) could mean that they are over-qualified by educational level in relation to the specific job requirements, but simultaneously under-qualified in terms of their experience (Tessaring, 1998).

6. Conclusions

One key message for those charged with designing effective learning programmes for the development of transferability is that the prime focus of the inter-relationship between education, training and employment needs to be upon learning. It will be important to ensure learners are given opportunities to improve learning to learn skills and that a sufficient range and quality of learning opportunities are available for individuals to develop their key skills. In particular, if the intention of a learning programme is to help learners develop the ability to transfer skills, knowledge and understanding, then learning contexts are required which draw attention to the significance of skill transfer. Processes of review and critical reflection are pivotal for this. Organised reflection on what has been learned and what needs to be learned in future can act as a bridge between working and learning, and as a bridge between the skills that are currently required and those that may be needed in future. Such reflective processes can also link into the development of more elaborated thinking processes that underpin the ability to transfer knowledge, skills and understanding. More generally, learners should be encouraged to make their thinking approaches explicit, through discussion with tutors, coaches or peers, of their approach to problems in their occupational area and of the networks or schemas they are developing to understand concepts and relationships in their area as a whole. By the same token it could be useful for tutors to teach thinking skills and strategies as an aid to problem-solving in occupational contexts.

The development of learner independence too is an important goal as learners need to take increasing responsibility for their own continuing learning possibly across a range of occupational settings. Similarly being able to learn and work in teams has become more significant in a variety of contexts and learning programmes should provide opportunities to develop these skills. It might be thought that the attention upon the process skills underpinning the ability to be effective in different contexts might result in the development of a substantive occupational knowledge base being downplayed. However, this is not the case. Rather the development of process skills ideally should be embedded in appropriate occupational contexts. Further, the development of a substantive knowledge base is important because it is central to the development of domain-specific expertise and because it forms a platform for continuing learning in the future. Indeed it should be

remembered that the ability to master a substantive knowledge base is itself a process skill, which can be valuable in a variety of learning and working contexts.

The design of effective learning programmes to develop transferability needs to be able to draw upon a variety of learning contexts, and designers need to be aware of the strengths and weaknesses associated with particular combinations of education, training and employment contexts. The quality of learning environments in companies can be particularly variable, and organisational cultures can either inhibit or promote effective learning. Similarly, patterns of work may be such that expertise can develop through a productive combination of working and learning. In order to make the best use of less favourable learning environments at work, it may be useful to use work-based projects, learning contracts and action planning in order to enhance and enrich work-based learning and to make it applicable to contexts beyond the immediate work environment.

Overall then, the authors of this paper have argued that that those designing learning programmes in vocational education and training should pay particular attention to promoting transferability such that learners are readily able to transfer what they have learned between contexts. Further, individuals should be equipped to be able to contribute to processes of individual and organisational knowledge development and utilisation in dynamic companies which offer working environments with considerable opportunities for learning while working. That VET should also have other purposes and that not all companies and patterns of work organisation enable opportunities for substantive learning are important issues, but they are beyond the scope of this paper. The paper though has indicated the increasing alignment between changing patterns of youth training and changing business processes, whereby it is likely that forward-looking practitioners from both contexts would agree that the essential developmental tasks for young entrants to enable them to function effectively in dynamic companies, which are operating in knowledge-intensive environments, relate to their abilities to transfer what they have learned between contexts and to engage in processes of organisational knowledge creation and development.

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