Attwell [editor] = Searching, Lurking, and the Zone of Proximal Development | 5 |

Graham Attwell [editor]

Searching, Lurking and the Zone of Proximal Development

e-learning in Small and Medium Enterprises in Europe

Perhaps the most important question is the relationship between education and training systems and informal learning. There is currently much attention paid to informal learning at a policy level. If informal learning could be systematised, it could be a cost effective route to increasing training. However in order to do this it is felt necessary to be able to measure the learning taken place - in other words to formalise that learning. As such the concern is to develop an exchange value to learning which at present is seen only as having use value. That is not to say that exchange values are only in the interests of employers and policy makers. In an insecure labour market, exchange values are important for workers. However present proposals and mechanisms to establishing exchange value are based on identifying equivalents within frameworks linking informal learning to formally acquired qualifications and therefore seem more likely to constrain rather than support the use and status of informal learning. A better approach might be to recognise the use
through profiling learning in
approach would provid
learning is valid
by qualificatio

navreme

the KnowNet

Education and Culture
Leonardo da Vinci

PONTYDYSGU

ICT & SME Project

Searching, Lurking and the Zone of Proximal Development

E-Learning in Small and Medium Enterprises in Europe

navreme | publications
Volume 5
March 2007

Education and Culture
Leonardo da Vinci

PONTYDYSGU

navreme knowledge development

Leonardo da Vinci

The production of this Report was financed by the European Commission's Leonardo Da Vinci Programme, coordinated by Knownet (Bangor, Wales), and published by navreme (Vienna, Austria).

Vol 5: Searching, Lurking, and the Zone of Proximal Development
[e-learning in small and medium enterprises in Europe]

Graham Attwell (ed.) - ICT SME project/Pontydysgu.
Series navreme|publications No. 5, ISBN 9989-50-052-5. 184p.
Pontypridd/Bremen, March 2007.

Cover by navreme (Vienna, Austria)
Typography and Graphics by Dirk Stieglitz (Pontydysgu, Bremen, Germany)

Content

Preface

Over the past few years, there has been increasing interest in the potential uses of Information and Communication technologies for learning in Small and Medium Enterprises. This focus stems from the realisation of the importance of SMEs in sustainable economic development and in the development of regional economies. At the same time, the increasing importance of information and knowledge in the production process and in stimulating innovation has pointed to the importance of continuing education and learning for SMEs. However, most research and surveys have shown that SMEs have only a limited capacity and participation in continuing education and training. Furthermore, the limited available research suggests SMEs are slow to implement new computer based technologies.

The ICT & SMEs project was a 3-year project funded under the European Commission Leonardo da Vinci programme to investigate uptake and practices with respect to technology-enhanced learning in SMEs. It was completed in 2006, having produced extensive research documentation surveying the state of technology-enhanced learning uptake and practice in small to medium enterprises in seven European countries. A range of different activities were undertaken including country studies (broad overviews), case Studies (detailed studies of SMEs in each country), Focus Group reports (reports from expert panel discussions held in each country), policy interviews (reports from interviews with policymakers/experts in each country) and four analytical reports covering infrastructure, people, processes and quality. A full report of the outcome of all the different activities can be found on the project website – www.smelearning.org.

This book is intended both a providing a summary of the work undertaken, and an initial analysis of the meaning of our results. Certainly, we were surprised by what we found. Firstly we wee somewhat taken aback by the lack of previous work in this area. Considering the policy emphasis on SMEs, especially as a future growth area in the economy and a provider of employment, and the importance placed on learning and competence development for innovation and competition, there seems to have been few empirical studies on the learning that takes place in SMEs. We also learnt that despite may initiatives and projects seeking to promote formal e-learning courses for SME employees, there seemed to be little take up and indeed only a limited awareness by managers of the potential of e-learning. In contrast, we found that many SME employees were using the internet for accessing information, solving problems, and taking part in on-line discussions as part of their everyday work.

We are aware that we have only scratched the surface – in the best tradition of research the project has left us with more intriguing questions than answers.

We hope this book may inspire others to go out and try to find the answers to some of these questions.

Thanks are due to all the project partners who have worked together to produce this book. Thanks are also due to Dirk Stieglitz who has worked diligently at turning a messy word file into an elegantly designed publication and to Bernd Baumgartl for endlessly harassing me to finish editing the book and finally let it go. I am still not happy with the copy, so advance apologies for the mistakes it undoubtedly contains.

Graham Attwell
Pontypridd, 2006

Project partners and people

Austria
Institute for Future Studies – www.futurestudies.org
Klaus Reich, Friedrich Scheuermann

Italy
Training 2000 – www.training2000.it
Elmo De Angelis, Fabio Giglietto

Netherlands
IVLOS, University of Utrecht – www.ivlos.uu.nl
Wilfried Admiraal, Ditte Lockhorst, Wilfred Rubens

Poland
AGH University of Science and Technology – www.agh.edu.pl
Andrzej Skulmovski, Kasia Piwonska

Spain
Florida Centre de Formacio – www.florida-uni.es
Nick Kearney, Alicja Mareja

Sweden
Interactive Institute – w3.tii.se
Laila Abdallah, Cecilia Katzeff,

UK
Knownet Ltd. – www.knownet.com
Graham Attwell, Al Harris, Mike Malloch, Claire Middleton

CRED Ltd. (external Evaluator)
Jenny Hughes

1. Introduction – Researching E-Learning in Small and Medium Enterprises

Graham Attwell

Educational technology has had a profound impact on education and training in the last ten years. Successive waves of development and implementation has seen progression from Computer Assisted Learning, usually CD ROM based, to the use of internet based Virtual Learning Environments and Learning Management Systems, and the more recent development of e-Portfolios and Personal Learning Environments. The provision of educational technology has become a major economic sector, in itself.

The benefits of ICT supported learning or e-learning are largely seen as flexibility, allowing learning to take place at a distance and at a time and pace suited to the needs of the learners. The development of e-learning has been seen as facilitating the Lifelong Learning required in a period of rapid economic and technological change and of supporting the just-in-time learning thought to be necessary for modern production and work organisation.

Educational institutions, social partners, national governments and the European Union have all readily embraced the use of new technologies for learning, through the sponsorship of programmes and projects to promote e-learning.

Despite such enthusiasm, the reality has been less than convincing (Attwell, 2003). The development of e-learning has been dominated by the metaphors of the virtual classroom and the virtual university, an over obsession with technologies and a focus on distance applications of existing learning opportunities, rather than the diffusion of learning in wider societal activities and forms. The term e-learning has become devalued to the extent where it might be more properly seen as a marketing word rather than a description of pedagogic and learning practices. There has been very limited attention to vocational and occupational learning and the development of e-learning environments in less formal learning contexts. Research suggests most learning - for good or for bad - takes place in everyday life and work social situations (Nyhan et al, 2003). In other words, most of our learning is informal learning taking place in a variety of social contexts. Despite this, most research and development has been focused on formal e-learning programmes.

There is little doubt that e-learning has had a major impact in large companies, both in allowing the extension of training provision and in facilitating professional development activities. However, the picture is far less clear when it comes to Small and Medium Enterprises (SMEs).

Policy discourses for of use of e-learning in SMEs have seen its introduction as unproblematic, based on a series of assumptions. Assumption number one was that SMEs appreciated that in order to become and remain competitive they must train their staff. Assumption number two was that one of the major reasons

SMEs do not train staff is due to the difficulties in releasing staff for training. Assumption number three was that e-learning could solve this problem by allowing just in time training, taking place on-line and at the workplace. As such, SMEs were a major target for extending the market for e-learning and for both private e-learning providers and for pubic institutionally based providers.

Research undertaken in seven countries by the EU funded, ICT and SME project, in line with other surveys and studies, has shown that none of these assumptions hold true. Many SME managers are unconvinced of the benefits of continuing (and in some cases, initial training), either believing that their enterprise already possesses the required skills, that if additional skills and knowledge are required the workers will gain these primarily through experience or that it is cheaper and more efficient to buy in trained staff rather than to provide the training themselves. Of course, this is a generalisation. The term SME covers a broad range of different enterprises, and the results of our research suggests that attitudes and involvement in training may vary by size and by sector. Furthermore, there is some evidence to suggest that involvement in training varies by country dependent on different cultures and systems.

Nevertheless, in the seven countries involved in the ICT SME study, there has been little evidence of consistent involvement in formal e-learning on a geographical or sector basis. That is not to say that learning is not taking place in SMEs or that computers are not being used for learning. In the case studies we have found a surprisingly high use of ICT for learning. This learning is not taking place through organised classes, face to face or through computer mediation, but is predominantly informal and social and utilises business and social software applications rather than purpose designed e-learning software.

The Leonardo da Vinci ICT and SME project has undertaken an extended literature review, a series of policy interviews, a survey of more than 350 SMEs, focus group meetings and around 110 case studies in the seven different countries. The project also undertook five thematic studies based on areas, which had been identified as central to the potential use of ICT for learning in SMEs: people, processes, infrastructure and quality.

This book reports the outcomes of the project. The first section contains a series of nation reports on the use of ICT for learning in the Netherlands, Spain, Austria, Poland, Sweden, Italy and the UK. These national reports summarise the results of the project bringing together data from the policy interviews, literature reviews, case studies and focus group meetings.

The second section of the book presents the five thematic studies. The third, and final, section presents two more extended contributions based on the outcomes of the research. The first looks at different models for supporting the use of ICT for learning and considers the strength and weaknesses and associated policy considerations for each of the models. The second summarises the major findings of the project and considers the possible implications, both for further research and for policy.

The general findings of the project in relation to the lack of formal e-learning provision in SMEs juxtaposed with the widespread use of computers for informal learning in SMEs has profound implications for future policy development. Nevertheless we would want to add a health warning. Our research faced a number of problems.

With the business survey, many of the partners faced difficulties in obtaining sufficient responses and as a result, the sampling methods are open to question. Secondly, the partners in the project often struggled to develop common understandings of key ideas, for example informal learning, and that lead to different interpretations of the data. Thirdly, and most important, is the heterogeneity of SMEs. We discovered considerable differences according to country, region, sector, size, financial strength, and length of establishment amongst others. Furthermore, the attitudes of individual SME managers have a huge importance for approaches to learning and training.

We have been forced to make *intelligent* interpretations of what is often contradictory data. Having said that, the data gathered by the project provides a rich resource for research in this field. We have been at some pains to use the data to illustrate our findings and recommendations wherever possible.

The different chapters of this book are designed to stand-alone. This means, inevitably, there is some repetition, although wherever possible this has been edited out. We hope this book will make a modest contribution to a field where little previous research has taken place and that it may provide a sound foundation for others to build on.

2. E-Learning in SMEs in Austria

Friedrich Scheuermann and Klaus Reich

This chapter summarises the results of the research undertaken in Austria for the ICT and SME project.

Survey

The business survey was targeted at small and medium sized enterprises in the two western regions of Austria: Tyrol and Vorarlberg. These are industrialised, export oriented regions with a service-oriented employment structure, mainly dominated by the tourism sector.

The sample from Austria was based on a random selection of small and medium sized enterprises from these two regions based on databases provided by the Chambers of Commerce of Tyrol and Vorarlberg. Overall, the questionnaire was delivered to 682 enterprises in Tyrol and Vorarlberg during January 2004.

The results of the survey show the difficulty in providing a coherent picture of e-learning in SMEs: SMEs operate in almost every sector of the economy, they have very different organisational and personnel structures and institutional backgrounds. As a consequence they vary widely in their learning and training needs and it is almost impossible to make general statements. Future research has to narrow the approach, for instance focusing on particular sectors, and has to consider the background of SMEs, e.g. business law, public subsidies, infrastructure. The statement "… a carpenter does not carry a laptop with him on the roof" highlights the problem. Although there certainly are possibilities for carpenters to use ICT for learning, (they use mobiles to communicate) this group has different ideas and needs than, for example, graphic designers. .

In general, Austrian SMEs have the technical capabilities and personal skills to use ICT for learning and many of them make use of new technologies for learning. The question of whether all SMEs need ICT based learning still remains unanswered. In general SMEs in Tyrol seem to be clustered in two opposed groups:

- The first group of SMEs make intensive use of ICT with a high number of skilled workers and a high proportion of employee/managers. These enterprises are well equipped with computers and the majority of employees have email accounts. Many employees follow training programmes organised by the company.
- The second group is characterised by low use of computers and email and a low proportion of skilled employees and university graduates. Training is still important for these SMEs, but not to the extent of the first group.

Only a few enterprises can be found in the middle, between these groups. These results may partly be caused by the composition of the sample, but may also reflect the general situation of SMEs. Many of them work in *know-how* intensive

fields and rely heavily on ICT. On the other side, many SMEs simply do not need ICT tools and training but work in traditional handcraft or artistic fields. These enterprises seem to have a traditional view towards using technologies and do not take into consideration the possibilities of mobile phones, PDAs, etc. and neglect (informal) learning taking place alongside business processes. Managers and/or employees in companies like this require basic information about the costs and benefits of ICT tools and an improved learning culture that broadens the understanding of *learning*.

Therefore, it is necessary to raise awareness, especially for managers and employees, about non-formal and informal learning processes. We need better integration, support and acknowledgement for informal learning According to Tough (1999), more than 80% of learning in enterprises is informal. The problem is that SMEs do not have the knowledge to make this learning visible.

It was anticipated that a starting point for the support of the second, more conservative group in relation to the use of ICT could be sector organisations but, on the basis of the sample, they do not play a prominent role in providing ICT based learning and training for their business sectors in Tyrol and Vorarlberg. However, the Chamber of Commerce and Chamber of Workers (umbrella organisations for sector organisations) have their own 'independent' training institutions. These institutions do play a major role in offering traditional training as well as ICT based training in Tyrol/Vorarlberg and Austria.

Overall, the results of the survey have to be seen as a starting point as obviously learning is understood in very different ways. The case studies conducted during the project give a more multi-faceted picture of learning (formal, non-formal, informal) taking place in SMEs.

Case Studies

Fifteen case studies were carried out during the project over a three-year period. The case studies focused on enterprises involved in the following sectors:

- web design and software development (six enterprises)
- service industries and tourism (six enterprises)
- manufacturing and industry (three enterprises)

The enterprises differed significantly in size, ranging from a one-man enterprise to an enterprise with 80 employees. Ten of the enterprises have from five to 15 employees. All are located in Tyrol.

The following analysis summarises the findings of the case studies in relation to the four analytic studies undertaken by the ICT and SME project.

People

The most important factor in the case studies is the role and attitude of the entrepreneur or administrative manager. He or she is the determinate factor in the use and application of ICT in general as well as for learning purposes. Most

managers had a very positive attitude to ICT and stated the necessity of their use in daily work. This positive picture changed when asked about the use of ICT for learning. Overall there is a division between very advanced managers who have recognised the importance of informal learning (especially in the IT sector) and managers who do not see the necessity of ICT based learning because of different reasons: no Internet access for employees, no training needed, satisfied with traditional forms of training, no knowledge about the possibilities of ICT based learning, etc.

In general the persons interviewed stated that they have good computer skills. Nevertheless, the picture might be different in specific sectors and overall the positive image presented does not really correspond to other field research and interviews carried out in different circumstances.

In general, responsibility for training is increasingly being shifted to the employees. There is an emerging awareness among employees that they have to manage their know-how themselves and consequently have to update it. Employees in IT enterprises seem to be more advanced in relation to this aspect than other enterprises. In this sector the interviewees are well aware of the need for continuous informal learning as well as certified training in order to demonstrate their expertise. Additionally, for some of the employees in this sector, it is easier to show their know-how in the form of projects or products that they have developed or produced.

The recognition of informal learning was not an issue in most of the case studies. With the exception of the IT sector, formal certification is still seen as more important. It should be noted that the Chamber of Labour has undertaken a major initiative to promote a certification system for informal learning (Kompetenzenbilanz). This not reflected in the results of the case studies.

On two occasions fear of solitude as a result of ICT based learning was expressed as a problem, but more important is that many employees do not want to spend time in front of their computers for learning (especially if they have to use computers for work). Many people would like to exchange and communicate with others and they are not really convinced that ICT can fully replace face-to-face meetings. From the interviews it appeared that people have a very narrow perception of the possibilities of ICT based learning. Most often it is associated with the use of Computer Based Training.

Other problems reported included the lack of time for learning and the language, as information and learning content are often in English.

Processes

Learning is arranged in different ways in the enterprises studied. None had a developed training plan or an explicit learning culture. In general, learning needs are viewed within a timeframe of one year, meaning that managers do not plan learning and training activities for their employees further in advance. In all the enterprises with five to 15 employees, learning needs are identified either by the

employee or the manager who together select training courses or seminars. In the smaller enterprises the manager or entrepreneur is solely responsible for training. Most training takes place at the premises of external training providers.

Many enterprises follow the idea of *learning by doing*. Especially in the IT sector, employees prefer to retrieve small chunks of information necessary for solving specific problems via online communities, newsletters or instant messaging tools. The employees of these enterprises are able to find information easily on the Internet or are involved in specialist communities. Furthermore, these enterprises are able, to some extent, to create their own, targeted solutions for learning purposes, e.g. setting up a learning management system for freelancers.

For longer programmes of training, *traditional* training modes are preferred. There appeared to be no idea of how e-learning could be integrated with traditional learning and training.

If enterprises could opt for technical solutions to solve their learning needs, some said they would like to integrate ICT based learning at the workplace within business applications. ICT based learning (in the form of seminars and longer courses) should be accompanied by an e-tutor as many interviewees stressed the need for social learning processes.

Asked about the attitude towards game based learning one answer summarised a view still shared by many: "Work is not fun."

In relation to supply chain learning, problems were reported in two of the case studies. Learning materials did not meet the specific needs of the smaller enterprise as these SMEs are very specialised in their sectors. They could only profit from very general learning materials, on safety and legal issues for instance, or from very specific, tailored learning materials.

Infrastructure

In general, enterprises are satisfied with their hardware and software. However, in some cases, computers might not meet the requirements for ICT based learning. Access to the internet is more of a problem as, in many cases, only the manager or his/her secretary has access.

The mountainous area of Tyrol imposes some additional problems, as it is difficult to provide all enterprises with high-speed internet connections. Even in the main valley (Inntal), just 15 km from Innsbruck, broadband is not available in some places.

Besides specialist information resources, employees, especially from enterprises in the IT sector (and to some extent from the service/tourism sector), accessed information from portals. Those services are much more frequently used than Learning Management Systems or Computer Based Training.

Desktop sharing is used by one enterprise as a means for online training of customers and for customer support.

As outlined above, SMEs have difficulties in finding suitable learning materials for a number of reasons. The market is not transparent; SMEs operate in niche

markets; SMEs do not have the time and knowledge to undertake extensive market research in order to find appropriate products.

Quality
The quality of learning and training is not an issue in relation to ICT based learning - there were no quality controls in the enterprises observed. Formal training and seminars are evaluated according to the personal impression of the learners and the same applies to internet based resources. Information is evaluated on an individual basis by its location (e.g. moderated forum), usefulness for a specific working task, ease of access (e.g. no log-in required) and also, availability in native languages.

If enterprises buy learning products, word-of-mouth advertising plays an important role – they buy products other enterprises have used.

Policy Interviews

Representatives of the following institutions were interviewed:
[A] Member of the Austrian government (Nationalrat) responsible for the educational policy of the Socialist Party of Austria; member of the educational department of the Chamber of Labour.
[S] Wirtschaftsförderungsinstitut Tirol, WIFI
[M] Management Center Innsbruck
[B] Tiroler Zukunftsstifung
[H] trans IT GmbH and project.service.büro (Univ. of Innsbruck)

The interviews followed a semi-structured questionnaire. Interviews lasted from one to two hours. The names of those interviewed have not been included but are represented by the letters next to their organisation in the list above. Once more the analysis is grouped according to the four analytic study areas.

People
The most important finding for one of the interviewees was that learners and trainers have the wrong impression about ICT based learning. From a learner's perspective, the interviewee expressed a fear of loosing social contact based on the perception that e-learning can lead to hours of solitude in front of a computer screen. For trainers, ICT based learning is connected to the uploading of files. This is a very limited picture of the possibilities and opportunities for ICT based learning. Taking such impressions into account [S] pointed to the need for more training of trainers for ICT based learning.

One interviewee pointed out that information and communication technologies will continue to gain importance as a means of learning as younger people in general have little problem using ICT and are used to these tools. Older people have barriers towards ICT, partly due to lack of know-how, partly due to a rejection of ICT in general. Another interviewee thought that these barriers might

be overcome by the use of customised learning solutions meeting the needs and interests of specific target groups (e.g. older people) [M]. Products should be developed in such a way as to reduce the fears and prejudices of people. Furthermore, the technologies used for web-design should take into account the needs of wider target groups, including the provision of web-readers and screen magnifiers for elderly or disabled people. This would also allow more user groups, such as workers who can only access the Internet in noisy surroundings or on small screens, to benefit from the Internet at the workplace.

Other views stated included

- support for pilots and pilot enterprises to encourage early adopters of new technologies in enterprises [S].
- tele-learning centres established in Austria about 5 years ago did not prove to be successful [A].
- checks for skills and competences attained through informal learning (e.g. Kompetenzenbilanz, Potentialanalyse) should be publicly supported as informal learning is becoming increasingly important [A].

Processes

The interviewees were not specialists in the field of e-learning and therefore only general answers on improving learning and training by the use of ICT were given. The following issues arose:

- ICT based learning should support social learning;
- Barriers to the use of ICT in general, as well as for learning, should be reduced;
- More information and assistance is needed for enterprises in order to use the potential of ICT for learning;
- Training services should be provided for individuals in order to help them to use ICT for learning (especially basic knowledge about web-browsers, search methods, documentation etc.);
- Blended-learning is seen as the only 'good' ICT based learning;
- Self-directed learning centres can provide learners opportunities for social contact.

Infrastructure

Suggestions for the improvement of infrastructure for successful ICT based learning mainly focused on public support for broadband initiatives. This could be through public subsidies, e.g. tax reductions or through private initiatives, for example there is an ongoing initiative by an Austrian bank supporting broadband connectivity. Most interviewees agreed that broadband access needed to be spread beyond the bigger cities.

Another suggestion for public support was the creation of vouchers for accessing internet cafes for learning purposes. This was based on the idea that many families cannot afford to buy a computer or cannot afford access to the internet.

The provision of vouchers would create equal opportunities for all to participate in the information society or at least would reduce inequality. Another suggestion was for a rental system for laptops or PCs for learning purposes.

The development of regional tele-learning centres has been seen as a means to improve the infrastructures for learners (as well as to guarantee social interaction with other learners in these centres). However, the existing learning centres were little used.

In terms of support services, it was suggested that either the Chamber of Commerce or the Chamber of Labour should set up counselling services for SMEs or individuals.

Quality

Quality was not seen as an issue by most interviewees. [S] suggested there should be awards for successful (e)learning. [A] and [S] think that quality management in training institutions, e.g. the use of EFQM or ISO 9002, is necessary to guarantee quality and this should include ICT based training.

Focus Groups

Two Focus Group meetings were organised in Austria. Institutions responsible for vocational education and training were contacted in order to gather information on their involvement in e-learning, especially in relation to SMEs. Meetings were conducted with relevant individuals in the field addressed by the project. The aim of these meetings was to involve stakeholders with an interest in the focus group session and outline topics and aspects to be addressed in the context of Tyrol.

The participants in the focus groups included representatives of leading institutions for vocational education and training in Tyrol, including the Berufsförderungsinstitut, the Wirtschaftsförderungsinstitut, and representatives of the Federal government of Tyrol, the Ausbildungszentrum West, the Tiroler Bildungsservice and the University of Innsbruck.

The focus groups were conducted as follows:

- There was an initial presentation of the project, its ongoing activities and results to date;
- The key actors presented their experiences and practices within this field;
- This was followed by discussion of ICT, learning and SMEs and possible future policies.

Overall the focus group meetings lasted for more than two hours each. The following section summarises the ideas put forward.

Some of the experts think that the use of information and communication technologies in enterprises is dependent on the size of the enterprise and the business sector. One participant cites a report from the Chamber of Commerce (July 2005) that just 50% of Tyrolean SMEs have access to the internet. From this viewpoint, the number of white-collar jobs, the technical equipment, the

availability of technicians and the general attitude of the managers are not so important. Other participants disagreed and identified major differences within enterprises in terms of access to ICT for managers and (unskilled) workers. Unskilled workers have much less access to the internet at the workplace as opposed to managers or office employees.

There was a discussion as to whether the private use of the Internet by employees of SMEs is higher than the use in their jobs. It was said that in the service sector many people do not have access to the Internet due to restrictions imposed by the management or lack of technical infrastructure. Other participants stated that during the last 5 years many enterprises have upgraded their technical infrastructure due to market pressure.

Nevertheless a lack of knowledge of the possibilities of ICT was observed, therefore the potential is not really known and the tools are not used to their full potential. According to one member of the second focus group meeting, this might result in frustration during the application of ICT as many people are swamped by the many possibilities of ICT and cannot really decide which tools and methods to opt for and in many cases choose the wrong ones.

In relation to ICT based learning, the participants had very different understandings ranging from online training and virtual classrooms to more informal learning. Furthermore, there were differences concerning the different technological, pedagogical wishes, needs and prerequisites of enterprises. Some of the participants felt enterprises would need self-directed learning whereas others opted for predefined learning concepts. One participant stated that e-learning overall could be too time consuming and expensive for SMEs. The lack of know-how about ICT based learning was resulting in the use of traditional learning processes, thus failing to exploit the full potential of ICT, especially for self directed learning.

In the case studies and in the business survey, the issue emerged that SMEs have a need for specialist knowledge. This was also discussed in the focus group. Here two directions for development were suggested. On the one hand, it was proposed that safety training, training on business and legal issues, information on standards etc. apply to many SMEs and therefore could be covered by ICT based learning materials. On the other hand, it was noted that the cutting edge know-how that some SMEs need couldn't be produced at a reasonable price. Additionally, who else could develop the subject matter for such learning materials than the SMEs themselves?

Another aspect addressed was the structure of e-learning courses, which are seen as too inflexible for SMEs. As a solution, one participant suggested to *granulate* learning objects as finely as possible and to develop micro-learning content.

For vocational education and training, the experts identified the following barriers to the use of ICT:

- traditional ideas of learning;
- poor and frustrating previous experience in the use of ICT for learning;

- fears by entrepreneurs that productivity might decrease or unexpected costs may arise;
- gender issues – different modes of accessing/using technologies according to gender are not equally addressed;
- existing solutions are too complex for many employees;
- fears that ICT based learning may result in isolation, is very impersonal and can be demotivating;
- need for self discipline;
- lack of use of different senses;
- lack of social aspects of learning (group feeling, fun etc.).

The advantages of the use of ICT for learning were seen by participants to include flexible learning, access to learning in the workplace, individual learning speed and simultaneous learning of content and ICT competencies. Access to information is facilitated and the space for individually shaping the learning processes is enlarged. Other positive aspects identified included the possibility for game based learning and the use of new learning methods. Additionally, the learning of ICT skills at the workplace is connected to individual empowerment.

The application of ICT and ICT based learning materials should be fast, diversified, independent of place, free of errors, easy to use and clearly structured. In vocational education and training the application of ICT should be accompanied by an experienced trainer/coach/moderator. E-learning materials should be under a free content licence. There should be a flexible structure for certification. Finally a balanced cost-benefit relationship is needed.

E-Learning in SMEs in Austria

3. E-Learning in SMEs in the Netherlands

Wilfried Admiraal, Ditte Lockhorst and Wilfed Rubens

This chapter summarises the findings of the research undertaken for the ICT and SME project in the Netherlands. Data was gathered through a business survey (completed by 132 managers of SMEs), 15 interviews with managers or owners of SMEs, six interviews with employees and six interviews with policy makers, and two expert meetings with some 20 participants each.

The first section describes the state of the art of learning in Dutch SMEs, including how learners perceive training, learning and professional development and how learning processes are organised, with and without ICT. The following section examines the technical infrastructure in SMEs including attitudes towards ICT as support for learning, training and professional development. In the next section, we report on policy matters concerning e-training, e-learning and professional development based on the reflections of SMEs employees, managers, and policy makers from governmental, sector and supporting organisations. In the final section, we reflect on the training and learning situation in Dutch SMEs and provide policy recommendations for ICT support for professional development and learning in SMEs.

Methodology

The business survey was undertaken to compile quantitative data on the organisational features of ICT supported workplace learning in SMEs. This survey, (paper-and-pencil or on-line), was completed by company employers and managers. A stratified sampling procedure was used, as a random sample was too expensive. This procedure included four stages. First, we selected four sectors randomly (training, tourism, pharmacy and electrical engineering) from the database of the Chambers of Commerce. Secondly, we sent a paper version of the survey to all 5,500 member of a monthly magazine for professionals in human resource development. Thirdly, we took a random sample of 500 SMEs in the tourist sector (some 14,000 SMEs in total) and of 500 SMEs from the pharmacy sector. The first sample was taken from a database purchased from the Chamber of Commerce. The second sample was taken from a database of the support organisation for pharmacists (Zorgplan). We sent these 1,000 SMEs a paper version of the survey. Fourthly, we sent a paper version of the survey to the entire population of 460 SMEs in the electrical engineering sector. Unfortunately the databases did not include email addresses. Although the response rate was low, our sampling techniques resulted in what we understood to be a representative sample of the population of SMEs in the four sectors. We received replies from 132 companies; 63 from the pharmacy sector, five from

the training sector, 36 from the electrical engineering sector, and 28 from the tourism sector.

The majority of the completed questionnaires were from micro and small companies (with less than 50 employees) in the service sector, located at one workplace. The SMEs in our study are companies with more skilled workers than employees with an academic degree, with slightly more women than men, and with many employees of around 40 years old. In addition, many of the employees follow courses, and the ICT resources are generally modest.

The 15 SMEs approached for additional information were selected from the business survey. In the business survey, managers were asked to indicate whether or not they would be interested to be involved in the additional interviews. This resulted in 10 SMEs in which the manager or owner was interviewed in order to gather more qualitative data in addition to the quantitative data from the business survey. For five of the SMEs we also interviewed one of the employees. The other five SMEs were selected in the third year of the project, based on the preliminary results of the first 10 case studies. The data showed a strong varience in ideas between sectors on the concept of learning. Due to this we selected one sector, the car sales and repair sector to concentrate on. The sector organisation provided us a list of companies they thought would be interesting to interview. |Three companies from this list were willing to co-operate; the other two SMEs were selected randomly from the Dutch yellow pages. One employee was interviewed in two of the five car sales enterprises..

The policy makers interviewed were selected for their activities and experience in training and learning and/or ICT in SMEs. Representatives of various policy-making institutes were selected including funding agencies, trade associations, governmental organisations and national training institutes.

In addition to the policy makers interviewed, we invited policy makers, consultants, researchers, and managers from various governmental, sector, training and research organisations to attend an expert meeting. For the first meeting, held in autumn 2004, 75 experts were invited; for the second meeting in spring 2005, 80 experts were invited. Both meetings were attended by 19 experts, of which nine experts attended both meetings.

Instruments

In the first section of the business survey, managers were asked for background information, including the number of employees, the sector of their company, characteristics of their employees (age, gender, and educational background), and aspects of the work environment (proportion of employees following training, using computers and email facilities).

The second set of questions referred to the use of ICT in the company, such as the use of various applications and of ICT for specific purposes. In the third section of the questionnaire, managers were asked their attitudes towards problem

solving in their company, the role of ICT in the work and learning processes, and the influence of sector organisations in their company. The fourth set of questions related to the barriers to using ICT for their company.

The semi-structured interviews with managers of the first 10 SMEs included eight sections. The first section included background information, such as the number of employees, type of organisation. The second section was on, the type of work, the organisation of work and the nature of the work to be done. Questions on the use of ICT, such as the use of various ICT tools, were included in the third section. In the fourth section, the companies' attitude towards learning and professional development was measured with questions on, for instance, the availability of training plans and policies for professional development. Formal learning was discussed with questions on the availability of training and the responsibility for training. The sixth sector included questions on informal learning, such as, to what extent employees' work in teams, to what extent problem solving at the work place occurs and the role of ICT. In the last section information was gathered about the companies' networks, including questions on relations between the company and their clients or suppliers and the exchange of knowledge. The employees' interview included more or less the same topics. Questions were focused on the employees' individual perspective. The interview for the managers and employees of the last five case studies were more focused on informal learning, with and without ICT, in relation to the daily work practice, as the first 10 case studies did not cover this topic sufficiently.

The semi-structured interviews with the 6 policy makers included questions on critical success factors and barriers in relation to e-learning at the work place, their organisational role and activities, and future prospects concerning e-learning.

Finally, in the two expert meetings policy makers and experts were instructed to identify critical success factors of work place learning in SMEs and discussed and formulated policy recommendations supporting e-learning in SMEs. In the first meeting, two questions were central to the discussion:

1. What is the most critical success factor in the use of ICT to support professional development in SMEs?
2. What policy recommendations are needed to address this critical success factor?

The second meeting was organised around models for the support of professional development and ICT in SMEs. Participants were asked to work with a particular model and answer three questions:

1. What are the business needs that support this model?
2. How can this model support business needs?
3. What role can ICT have?

Analysis

The data has been analysed in an iterative way, using a grounded-theory approach. In order to arrive at a manageable set of data, data from the four sources has been used to provide a thick description of the perceptions of ICT and workplace learning

in SMEs. This thick description has the form of a grid. Then, for each data source, content analysis was carried out including processes, infrastructure, quality and learners. These content analyses resulted in an analytical summary table. The sorted data and the results have been presented and discussed during project meetings. In order to maintain and determine the quality of this procedure, the results of the last iteration of the analysis were checked by the researchers who were responsible for the first two iterations of the analysis of the data. If this combination of member check and critical-friend approach resulted in disagreements, these were sorted out and solved by reformulating and deleting interpretations.

Learning in SMEs

The Learning Culture

We depict the learning culture of a SME as the significance that is given in an organisation to learning. It is expressed in the degree (strong to weak) to which learning is seen as important for the organisation itself and for the employees working in this organisation, and to what extent this feeling is shared by management and employers. We agree with Fuller and Unwin (2003) who emphasise the affordance of learning opportunities for employees. They conclude that an expansive organisational learning culture was likely to be found in sectors supported by a long tradition of apprenticeship training and a readily identifiable training infrastructure in which knowledge and skills are recognised as being widely distributed throughout the organisation and in which formal qualifications are valued.

The learning culture of the SMEs in this study exhibited strong variations. Some of the companies, especially in the car sales and repair sector and the pharmacy sector, show a strong learning culture. Learning is necessary and therefore valued highly. There is a need to update skills and knowledge as work processes in companies change continuously, due to technological developments in the product, changes in the production process or developments in the market. In addition to this sector or product specific knowledge, social skills have become of equal importance, as employees have to be more focused on service provision. Both managers and employees consider it important for their company that employees learn and that the management invests in the personal development of their employees. Accordingly, in one of the companies from this study, both employer and employees initiate learning. In this company, personal development plans are used, employees can follow various forms of training and there is room for informal learning in daily workplace practices. The less motivated employees are stimulated to follow courses and training by both the employers and their peers.

Other companies show a weaker learning culture. In most cases, these are the smaller SMEs. For example, in a small company (with three employees) selling and repairing cars, neither the owner nor the two employees feel any need to learn. They discuss, once a year, how things went in the company, but this is not aimed at professional development.

In considering a learning culture, formal learning in terms of attending courses and training programmes is essential, not only in the perception of managers and employees of SMEs, but also in the perception of the experts and policy makers. In line with the work of Billett (2001a; 2001b), we want to stress the importance of informal learning in defining a learning culture in companies. It is important to consider how to afford workplace learning in SMEs focused on sharing knowledge, room for problem solving, and work engagement of the employees.

The Organisation of Learning

Performance assessment and personal development plans are often used in the SMEs in our study, except in the micro SMEs (with less than 10 employees). In most cases, however, companies do not have a plan in which learning and professional development is explicitly addressed. Again, there are differences between companies, even within specific sectors. In some companies in the car sales sector, employees use tcompetence profiles based on their job function. The profile explains the decisions for attending courses or training programmes. In addition, the personal development of an employee is discussed regularly through performance assessments. A small car company we surveyed did not work with personal development plans or assessment at all, however the owner did offer the employees ten days training a year.

In some sectors, such as the car sales sector or the pharmacy sector, it is common for suppliers to be involved in the professional development of the employees of a company. Car manufacturers such as Ford, Audi or Volkswagen use competence profiles for mechanics of companies selling and repairing their cars and based on these profiles, life-long learning paths have been developed. In one of the car sales and repair companies interviewed, a training database is used, including a long term plan stating what the company has in mind for the employee and what the employee tries to achieve. The employer decides whether an employee can attend courses and invites mechanics to attend a training programme. In another car company, new employees are obliged to undertake a diagnostic test, provided by the supplier. The supplier assesses the service advisors, (those who sell cars and communicate with the clients). If the aspirant employee does not pass the exam, the supplier advises the company not to hire the employee; at the very least the supplier will not pay for any training activities of this employee.

Companies report different arrangements for supporting training for their employers. In some companies, employees have to pay for their training if they leave the company within one year. Other companies do not provide time for attending training programmes organised by others, but facilitate apprenticeship learning, training new and young employees 'along the way' with experienced professionals.

Learning is organised differently in the individual SMEs in this study. Some focus on formal learning, employees attend training programmes. In many companies, informal learning is as important as formal learning. Employees discuss problems in their work with colleagues, mostly in face-to-face work meetings. Employees

play an important role in providing feedback on work processes. Based on this kind of feedback, the company management sometimes implements changes in work processes. Some companies do this systematically. In addition to face-to-face meetings, email, (mobile) telephone, and sometimes even MSN or SMS is used to communicate with colleagues about the work. In most companies, both formal and informal learning takes place during working time but learning by employees outside working hours is also reported. One company organises external training during work time, and an internal training programme in the evening.

Formal Learning

We describe formal learning as learning that takes place within a training programme, a course provided by an (external) educational organisation or training institute or courses provided by an internal trainer. Formal learning means that learning takes place within an established framework of educational activities and therefore can be seen as intentional learning (activities with the primary aim of learning instead of working).

In several sectors in the Netherlands such as the car industry and electro-technical industry, formal learning is compliance driven. In general, employees are obliged to attain certificates. In addition, employees are obliged to attend training programmes if the company wishes to become a service agency for a supplier. Formal training is often organised by suppliers/vendors and is free of charge. Some companies in our study attend (generally inexpensive) courses that are organised by sector organisations. For example, in the car sales sector, the sector organisation provides training programmes focused on repairing cars and on support services.

In most cases training programmes are held outside the company and during work time. One of the companies in this study employed an internal trainer, which is less expensive than employees attending training programmes elsewhere. Moreover, internal training programmes might stimulate social bonding. Some companies report having a *train-the-trainer* concept: a selection of employees attends training programmes of a supplier, and guide other employees later on.

Online support for formal learning is rare. In some cases, CD-ROMs are used for learning: one company uses an online programme that has been developed specifically for that company.

Informal Learning

We describe informal learning as both intentional and non-intentional or spontaneous learning, with activities based in the work practice of SMEs. These activities can have the aim of providing learning for the employers and employees (e.g., tailor-made coaching of an employee); non-intentional informal learning are activities which have their primary aim in solving problems in the work process (and which may result in learning as an (important) side effect, such as group work on how to solve a work problem in the company. Informal learning happens in all companies in this study, although respondents were not always conscious of

the learning process itself. Work related problems or issues are discussed during lunchtime or during the work process with colleagues, or with more experienced colleagues (e.g. a master mechanic). Additionally, employees use technical manuals to solve problems, and if they are not able to solve a problem, they contact the supplier. Only one small company from the car business explicitly mentioned that employees did not share problems with each other.

In many cases, informal and formal learning are connected through the context of apprenticeship. Sometimes this evolves spontaneously, as the senior employee is the most relevant person to ask for help.

Some companies reported that employees work in teams. These teams trigger informal learning. Work related issues are discussed during and after work. Team meetings often result in the sharing of knowledge and information. However, many companies mentioned that employees work on their own. Informal learning can include consulting senior employees or consulting manuals. The volume and intensity of informal learning in a company seems to be related to the organisation of the work process (individual or in teams).

The use of ICT is common for informal learning in Dutch SMEs, but is strongly related to the sector and type of company. Several companies have databases (e.g. ERP systems). Furthermore, the Internet is often used to search for information with the purpose of performance support and providing work instruction. E-mail is used (in about 50% of cases) for sharing information within the companies, with vendors, and in several cases, with customers.

The Role of ICT in Learning

ICT plays an important role in work processes in SMEs, although there are sector differences (low ICT use in the hospitality sector, high use in the technology sector). ICT is part of the daily work practice of the employees in the technical sector and also in some companies in sales and customer relationships. One company is working on an advanced ICT system to inform clients about their car repairs or the arrival of their new car. In many companies in this study, the steps taken to use ICT in (informal) learning are small. Organisational issues also stimulate the use of ICT: part time work sometimes makes face-to-face communication difficult.

ICT is mostly used for informal learning, often resulting in non-intentional learning: employees discuss work related issues during the work process, search online manuals or databases, ask senior employees for help, and use email for communication and discussion within the company and with vendors and clients. In a few companies, employees participate in online communities of professionals. ICT is rarely used for formal learning, although its use is growing. Most managers support the use of ICT for learning (seeing advantages as the reduction of travel time, the opportunity for employees to learn in their own time and the reduction of opportunity loss), especially for the acquisition of knowledge. Some see no purpose in the use of ICT for formal training pointing to the social role of face-to-face training.

A constraint on the use of ICT in learning in SMEs is access of employees to Internet and e-mail. Access to a computer depends on the status and the work of the employee. Some employees have their own computer; some use a computer in the production area whilst others have no access to computers. According to one manager, not all the employees have sufficient ICT skills; they use ICT in a limited way.

Context Issues

SMEs are heterogeneous and managers and employees have different perceptions of the need for and organisation of learning or professional development. Various factors influence the perception and organisation of learning. First, the type of company or sector is important. For example, companies in technology-oriented sectors are more focussed on learning and ICT. Employees in the ICT sector are accustomed to self-learning, and in the production sector employees are familiar with the use of ICT. Secondly, the work processes in SMEs differ strongly. Whereas in some sectors, such as the hospitality sector, much work is routine, in other sectors the work is more complex and less standardised. Also the way people work in the SMEs is different: in some SMEs people work on their own whilst in others people work in teams. Thirdly, in many companies work is changing constantly due to technological development, legislation and market developments (more tailor-made, service-based, and client-based). Suppliers also increase their demands and these have to be met by SMEs. Fourthly, the size of the company does matter. In general, the smaller SMEs do not have a person who is responsible for the professional development of the employees, whereas in the larger SMEs managers are responsible for the training and professional development.

Different characteristics of the learner influence the perception of and the motivation for learning at the workplace and, indirectly, the organisation of the learning process in companies. Firstly, the level of education influences the attitude of employees towards ICT and problem solving. Highly educated employees are more positive towards problem solving (learning) and ICT. Employees with a higher degree are also more skilled in the use of ICT and use more and different ICT tools. However, the number of highly educated (university degree) employees in SMEs is quite low. Secondly, younger people are more open to ICT and are more skilled in the use of technology. Thirdly, female employees tend to be more motivated for training than their male colleagues and they have a positive attitude towards the use of ICT. Fourthly, the more employees are involved in formal training programmes, the more they use ICT for communication and the more positive their attitude towards problem solving.

Technological Infrastructure in SMEs

Technical Infrastructure

The technical infrastructure in the SMEs will be described in terms of the state of the art of the hardware and connectivity, the ICT competences of the employees,

and the attitude of the employees and employers towards the use of ICT. Most the SMEs investigated have email and Internet connections. In many organisations, computers are networked, except for the hospitality business in which stand-alone PCs are more common. For security reasons, employees of many of these SMEs are not able to log in to the network from outside. Smaller SMEs lack infrastructure or have firewall problems. Although most SMEs have an Internet connection, this does not mean that every employee has access to a computer or to all applications. Some companies have several computers with Internet access, whereas in others only PCs in technical work areas or for management or senior employees have internet access. For example, in the car sales sector, some companies have rooms where mechanics can discuss problems, and where they can use (electronic) manuals; other SMEs indicated that only the manager had access to the computer.

The interviews show that the employers' access to email varies: in one company, all the employees have an e-mail address and email is used for internal communication; in other companies, mechanics do not have email (except the chief mechanic). Emails from suppliers (e.g. newsletters) are printed or published on off-line bulletin boards.

The companies reported that older employees lack skills to use ICT hardware and software. Overall, it seems that these people lack experience with e-learning, and do not see e-learning as useful for the organisation. With respect to the attitude of employees towards ICT, we can say that employees of medium sized SMEs show a relatively positive attitude towards using ICT and that there seems no relation between business sector and attitude towards ICT.

ICT Related to Work Process

In most companies, ICT is used in the business process. Email and the internet are used for communication with clients, suppliers (e.g. buying products, order tracking) and other companies and to retrieve information from suppliers. Some of the suppliers have an intranet that may be used for tracking orders. Some SMEs use the intranet for technical support (information) and to access manuals. In most companies, e-mail is used for internal and external communication. However, only a few companies provide all employees with an e-mail address, in others only senior employees have e-mail.

Many of the companies use databases for administration and finances. In addition, some companies are utilising e-commerce applications, others are involved in local community networks and web portals. Few SMEs use the Internet for networking or video conferencing, although there is increasing use of Voice over IP (VoIP). Some companies already use CRM applications; others have plans to use them.

Many companies have websites to provide information about products and services. For example, one of the garages in this study uses their website to provide information to their customers, including events, special offers and progress reports on car repairs.

Generally, ICT is little used for training purposes. In the agricultural sector, the internet is used as a communication tool for networks of entrepreneurs. Sometimes CD-ROMs are available for individual training. A national training centre for pharmacists is participating in the development of a digital portfolio system.

Context influences the use of ICT in the organisation. From the business survey, we know that the larger the company (number of employees and work locations) the more (different) software is used and the more ICT is used for communication. There is no relation between the business sector and use of ICT in the organisation. The more employees have access to computers and have their own email address, the more they use ICT for communication and the more positive is their attitude towards ICT.

Policy Interventions

(E-)Learning in SMEs: how?

One of the respondents described three types of learning taking place in SMEs in the Netherlands:

1. Master-apprentice;
2. Employees receive a budget for training
3. One-man company, the owner trains him or herself (in networks of colleagues).

The first two are forms of formal learning, whereas the latter relates to informal learning. Although in many SMEs traditional ways of learning were described, some mentioned a transition from traditional learning to self-learning, authentic learning, and more tailor-made individual learning. Many schools and companies do not recognise this form of learning. Many respondents saw guidance and coaching as an important success factor in tailor-made learning and training in SMEs.

In most SMEs in the Netherlands, decisions on training are taken ad hoc, although size does matter: in smaller SMEs, HRM activities are dependent on the manager/owner, whereas in larger SMEs learning is generally institutionalised. Generally, in the Netherlands there are few legal obligations on SMEs for the professional development of employees. Learning and professional development is not structurally an issue in SMEs. It is up to the ambition and initiative of employers whether or not learning and training takes place. At a sector level, structures for training have been developed, but it is up to the manager to decide whether or not to use them. In some SMEs, mostly the larger ones, or those who are member of a chain of companies, training is more institutionalised, and formal training is assessed; employees receive a certificate. Sometimes an employee is not allowed to attend a course if he or she failed a former exam. In one company, the productivity of each employee is assessed and reported in a portfolio; each employee has a one-year contract and if employees do not meet the criteria after two years their employment is terminated. Our respondents mostly refer to formal learning when they talk about learning in SMEs. In the perception of the policy

makers, many managers are negative towards training as it interferes with the work process, even if it is e-learning, and there is a fear employees will leave after they complete a training programme.

The policy makers recommend more attention to informal learning, including the organisation of informal learning. In many SMEs, informal learning, especially non-intentional learning, is not seen as learning despite the fact that in some sectors much informal learning takes place. Sector organisations do not recognise informal learning and therefore do not provide support. However, the informal training culture is important as it secures the relation to the work practice. Learning must fit the contextual possibilities of the company.

Quality Monitoring and Legislation

Legislation for quality assurance can stimulate SMEs to pay attention to the professional development of their employees, as long as legislation fits the needs of the SMEs. According to some of the respondents, all legislation focussing on traditional education should be abolished. As stated above, in the Netherlands the initiative for professional development is generally up to the employee, whereas the employer is free of obligations.

Legal regulations with respect to learning and professional development are very different across sectors. In some sectors, registration and certification is becoming less obligatory. In the pharmacy sector, pharmacists can gain registration points, but this is not a requirement. Only 5% have a training plan, and most decisions are taken ad hoc. According to the respondent, legal registration would stimulate learning. At present, internal training is increasingly common in pharmacies, which lowers the quality standard. In the hospitality sector, the requirement for certificates has also been abolished, decreasing the need for training. Some 80% of employees in the hospitality sector are not qualified. In contrast, employees in the process industry are often highly skilled but this is often not officially recognised by certificates.

In general, quality monitoring is seen as a stimulus for training and learning in SMEs, and thus e-learning. In several sectors, certification structures are being reformed and implemented. This includes EVC (the recognition of formerly attained competences) and ISO certification. For example, in the hospitality sector a new diploma structure has been developed, in which a distinction is made between novice and experienced employees. This structure will have a relation to the EVC procedure and will include the use of portfolios. Another example is the process sector in which a (competence based) qualification framework is being developed. Employees receive certificates based on competencies acquired from informal learning.

Several companies are certified (e.g. ISO-certification). This implies that work processes and procedures are pre-described (standardisation of work processes). Work is audited and evaluated (internally and externally). Furthermore, quality

assurance requirements may oblige employees to become certificated (standardisation of knowledge and skills). In these cases, learning is compliance driven.

The sector organisation is responsible for the development of a qualification framework and for the accreditation of companies to provide internships. SMEs seldom report on quality assurance of training and learning: only rarely do managers evaluate the usefulness of training and learning processes for their employees. One of the managers of a car company said he was convinced that his mechanics needed training to perform their work. Employers choose e-learning only when they see return on investment.

Infrastructure

As indicated above, most SMEs in the Netherlands have an adequate technical infrastructure. Smaller SMEs and schools lack infrastructure or have firewall problems. Respondents mentioned various ways to support SMEs lacking adequate infrastructure. Regional networks of SMEs could make joint investments or regional educational centres could support employees. A national task force could encourage the upgrading of technical infrastructure. SMEs also need support in the use of ICT.

Sector organisations could support SMEs with applications and software. One respondent felt the largest benefit would be achieved in using ICT for the organisation of learning (LCMS). The sector organisation can have a facilitating role. Another suggested linking content management systems between different organisations to facilitate networked learning.

Funding

In the interviews with the policy makers, respondents paid much attention to the role of funding. Many stressed the importance of funding both organisations and schools at national and sector level. There are various ways of funding SMEs. Some proposed the use of vouchers to stimulate professional development are often mentioned. At a national level, regulation through taxes might help. Respondents also indicated that the use of e-learning in formal and informal learning should be stimulated by sector organisations through funding of the development of e-learning content and consultancy. In the process industry, the sector organisation tries to stimulate the use of ICT by involving SMEs in innovative projects. SMEs experimenting with e-learning are funded. In some sectors, SMEs receive sector funding if their employees attend a course.

Consultancy and Training

Training and consultancy activities are often organised and delivered by sector organisations. The respondents are quite clear in their opinion that these sector organisations are responsible for stimulating and supporting e-learning in their

sector. The hospitality sector plans to develop a web portal offering information on demand. It will also function as a broker and will provide customised e-learning. The process industry sector organisation is attempting to stimulate ICT use by participating in innovative projects involving SMEs. In the pharmacy sector, a national training centre is developing a portfolio system with tailor-made learning arrangements. In some sectors, the suppliers have a strong role (for example the car industry). They provide training when new materials are released or to keep staff up to date. This 'service' is not always appreciated according to some of the managers interviewed. Some of the SMEs are obliged to send employees for training. Several managers complained about the cost and that the supplier has a monopoly for learning.

According to the policy makers, sector and other organisations have a dual role in consultancy and training for e-learning. People should be stimulated and motivated for learning and professional development in general, and in particular in using ICT for learning. No learning takes place without motivation. Companies need to see added value and relevance. E-learning training structures and training content should be developed. CD ROMs are available and used, but very few SMEs are involved in online communities and networks involving peer organisations and experts. Several respondents indicated the importance of creating regional and national networks for community learning. SMEs are increasingly dependent on relationships with other companies, supply chains, sector organisations, social partners and public bodies. SMEs need to be engaged in collaborations to take on tasks that otherwise would be beyond their individual reach. Moreover, communities of practice and of learners seem to have a positive influence on their learning processes, especially when these communities address work-related issues or are rooted in daily-work processes. This corresponds with the dominance of informal learning in SMEs, and aligns with the contemporary pedagogical view that learning is a social process where workers actively discuss and collaborate around issues that matter both for them and for the work they are doing. Smaller SMEs could benefit from the exchange of experience and the communal use of experts, training materials, etc. Regional centres could support these kinds of SME networks.

Collaboration With Schools

Although in the Netherlands the teaching of novices is a mutual responsibility of schools and companies, many companies feel schools are solely responsible. Owners and/or managers need a change in attitude to invest time and effort in training. One of the respondents (from the hospitality sector) mentioned that students today are not motivated to work in traditional schools; they need an inspirational environment. For instance, identification with famous employees (cooks) motivates young professionals to learn. Motivation decreases

when training takes place out of the workplace. Many respondents indicated the importance of coaching student-employees for motivation and guidance in learning.

Reflections

This section reflects the state of the art in relation to learning and professional development in SMEs and the possibilities for e-learning in supporting learning at the workplace. Various companies and policy makers have been questioned and interviewed. In this section, we reflect on their statements and will relate the policy makers' views to the needs of employers and employees.

1. In thinking about the learning culture of the companies one is primarily focused on formal learning, while in our opinion the learning culture is more strongly influenced by the possibilities of informal learning in an organisation. As Billett (2001a; 2001b) argues, the learning culture is determined by the potential of the organisation for workplace learning focused on sharing knowledge, problem solving, and work engagement. We found a considerable number of examples of intentional and non-intentional informal learning, however many respondents did not recognise this as learning. We recommend policy measures aiming at raising consciousness of informal learning as learning in itself, and of how to create possibilities to stimulate informal learning in SMEs, for example, working in teams and sharing subject related and work related knowledge (see also Billett, 2001a, 2001b).

2. Apprenticeship (novice-expert coaching systems) can stimulate informal learning. Although, in essence, an apprenticeship is an aspect of formal learning, the activities within the apprenticeship are often directly focused on the work process. This could operate as a bridge between formal and informal (intentional and non-intentional) learning.

3. The survey, interviews and focus groups show that the use of ICT in the work processes is common in SMEs. ICT is used to facilitate or support informal learning. We recommend policy makers and sector organisations to support e-learning in informal learning processes, even though this might mean that they have to deal with two kinds of innovation, e-learning and informal learning, and consequently have to overcome two challenges.

4. We have doubts about the use of e-learning in facilitating formal learning. All too often, in training situations, courses are copied to the Internet without considering the possibilities of e-learning. Traditional courses are still traditional even if online. Besides, many SMEs indicated the need for tailored courses, which are often too expensive to develop.

5. In relation to the infrastructure supporting and facilitating e-learning, one could think of initiating (regional) networks of companies to share knowledge and costs. These networks could have the characteristics of a community of practice. SMEs are increasingly dependent on relationships between other companies, sup-

ply chains, sector organisations, social partners and public bodies in order to be engaged in tasks that would otherwise be beyond their individual reach. Moreover, communities of practice and of learners seem to have a positive influence on their learning processes, especially when these communities address work-related issues or are rooted in daily-work processes. This corresponds with the predominance of informal learning in SMEs, and aligns with the contemporary pedagogical views that learning is a social process where workers actively discuss and collaborate around issues that matter both for them and for the work they are doing.

6. The inadequate infrastructure in some SMEs, mostly the smaller ones, and in some sectors is an issue. Respondents report employees having limited access to the Internet and email, which prevent informal e-learning. Financial support for these smaller SMEs might be part of policy to improve infrastructure or to provide infrastructure through regional centres.

7. Both managers of SMEs and policy makers have mentioned financial support, such as subsidies or vouchers, frequently as a policy measure to stimulate e-learning in SMEs. We encourage financial assistance as long as it is accompanied by other initiatives. Only a few SMEs reported working with competence profiles, personal development plans, and quality control. We would like to see grants tied to developments in this area. Certification, for example, seems an interesting way to stimulate learning in companies, as long as this certification is also based on informal learning (competence development) of employees.

8. In facilitating e-learning in SMEs, the policy culture of a country has to be taken into account. In the Netherlands, governmental interventions are limited; sector organisations and companies are responsible for learning and professional development and support. Policy measures should correspond to such culture. For the Netherlands this implies facilitation and infrastructure on a regional or sector level, rather than central government intervention. Legislation and systems for quality monitoring are found at sector level in the Netherlands.

9. In the Netherlands the sector organisation appear to be the level at which to develop policy and to take initiatives. This may be different in other countries.

10. We have seen strong differences in the learning and working culture between companies, which seems related to the size of the companies, and even more importantly, related to the sector or field. This implies that future research and policy measures should be focused at field level, or at least sector level. Limitation to sector level might not be sufficient to address differences between companies in relation to the learning and working culture and processes. As mentioned before, differentiation in size, and the nature of work processes (standardised versus complex work processes) of a company might be needed as well. We recommend policy makers, and also promoters of projects, such as the European Commission, to address these differences. This might result in more specific calls related to e-learning.

4. E-Learning in SMEs in the United Kingdom

Graham Attwell and Al Harris

The present study aims to assess the levels of learning and ICT in a regional sample of SMEs. It intends to study the company demographics, learning cultures and ICT use of regional SMEs. Through the analysis of the relationships between these variables it is hoped that controlling factors in the use of ICT for vocational training in SMEs will be identified.

Method

The present study used a convenience sample of 42 businesses. Businesses were recruited through telephone calls and door-to-door requests. The regions covered by this recruitment were Bangor and Pontypridd, both located in Wales, UK. Only business meeting European Commission criteria (European Commission, 2003) for small to medium enterprises were included in the sample. The sector of business was not a controlled variable.

The partners of the ICT & SME project developed the survey used in the study. The questionnaire was adapted from the original in terms of item wording. This was to make the survey more appropriate for the language of participants. It is a 58 item self-report questionnaire. Items are grouped in sections covering the following topics: background information; use of ICT within the company; frequency of use of ICT for specific purposes; attitudes to problem solving; attitudes to ICT; business networks; and barriers to the use of ICT. Items are scored as either multiple-choice answers or on a likert scale of 1-5.

Participants were given an information sheet and verbal introduction to the survey. They were then required to complete the survey. No time limit was in place. In the majority of cases, a researcher was present during survey completion.

Research Methods

Case Studies

The case studies comprised a series of research studies investigating the factors involved in the use of ICT for learning and training in SMEs. The term "e-learning" has been widely adopted by researchers and practitioners to describe ICT based learning activities.

To date the majority of e-learning tools and materials have been in the form of formal structured courses. This is partly due to the early adoption by distance learning courses. Since the mid-1990's, e-learning has grown into a highly profitable commercialised industry but it is still centred on major educational institutions such as universities and private education specialists.

The European Commission defines SMEs as any "enterprises which employ fewer than 250 persons and which have an annual turnover not exceeding 50 million euro, and/or an annual balance sheet total not exceeding 43 million euro." (European Commission Recommendation, 2003). SMEs represent an, as yet, under-exploited market for the development and provision of e-learning materials.

Technology has been recognised as a major force of change in the field of work organisation and practice. As yet, SMEs have been reluctant to adopt standard e-learning resources. A CEDEFOP and European Commission study (2003) has shown that SMEs are very limited in their use of e-learning, both in number of people using and in subjects covered. The reasons for this are to be explored in part by the present study. However, current learning and business theory may be able to provide some potential hypotheses. Firstly, the parameters of vocational learning are much wider than that currently covered by "e-learning solutions". The majority of e-learning tools are in the form of structured courses covering generic subject areas. The focus of the industry is very much on formal learning, providing virtual classrooms and digital course media.

As used in this study, vocational learning and training is a wide reaching term that encompasses all forms of knowledge sharing and acquisition in relation to professional development. This includes both formal and informal types of learning, from structured courses to work-related conversations with colleagues. Informal learning and education can be defined as

> *"… the lifelong process by which every individual acquires and accumulates knowledge, skills, attitudes and insights from daily experiences and exposure to the environment – at home, at work, at play: from the example and attitude of families and friends; from travel, reading newspapers and books; or by listening to the radio or viewing films or television. Generally informal education is unorganized, unsystematic and even unintentional at times, yet accounts for the great bulk of any person's total lifetime learning – including that of a highly 'schooled' person." (Coombs and Ahmed 1974: 8)*

The application of this concept to the working environment immediately opens up a great deal of alternative vocational learning concepts.

Reading current news and research, sector networking events and even conversations with work colleagues, all contribute to the acquisition of knowledge and skills in the workplace. Technology has further expanded the opportunities for learning in the workplace. Email, newsgroups, forums and weblogs have radically increased the speed and scope of communication. Information on almost every subject conceivable has become available via the Internet. Software applications have been developed for the majority of office based activities bringing daily work into the digital age.

The tailoring of these facilities to informal learning practices has been an area largely ignored by e-learning developers. SMEs practice and learn within their own work related communities. The primary community is that of the employees within the company, who may exchange knowledge and skills through their

daily practice. Further communities could include networks within the sector and informal networks with other professionals. The concept of "communities of practice" was developed by Leve & Wenger (1998) and has important implications for informal learning. It can be summarised as follows

> *"Being alive as human beings means that we are constantly engaged in the pursuit of enterprises of all kinds, from ensuring our physical survival to seeking the most lofty pleasures. As we define these enterprises and engage in their pursuit together, we interact with each other and with the world and we tune our relations with each other and with the world accordingly. In other words we learn.*
> *Over time, this collective learning results in practices that reflect both the pursuit of our enterprises and the attendant social relations. These practices are thus the property of a kind of community created over time by the sustained pursuit of a shared enterprise. It makes sense, therefore to call these kinds of communities, communities of practice." (Wenger 1998: 45).*

The advent of new technology has great potential for influencing the work organisation and knowledge management of SMEs. Current research has shown limited use of the formal e-learning opportunities available to SMEs. Concepts such as informal learning and communities of practice are factors that have prompted little investigation yet have much relevance to the knowledge culture within these companies.

This study aims to investigate all forms of technology use and learning within SMEs. Through studying individual cases of interesting practice, the investigation hopes to shed light on the dynamics involved in use of ICT, vocational learning and communities of practice.

Method

Companies were recruited for the survey by a range of methods involving multiple telephone calls and email, personal contacts and standard mailing. We found a hit rate of just 1 company agreeing to interview for 9 companies contacted. Our attempts to interview a representative sample of companies involved in the automotive supply chain met with no success. We believe, from the comments we received, this was due to the nature of the extended chain of responsibility inherent in the automotive supply chain.

There was reluctance by local senior staff to expose themselves to potential censorship by those of senior rank despite assurances of anonymity. The request for surveys were often commented upon as " a waste of our time" and on a number of occasions payment for the proposed time taken to complete the survey was requested by the companies, and declined by ourselves.

Interviews were requested with the most senior members of the companies available, with interviewees having a good overview of company procedures and practices.

Interviews were conducted as informal conversations stepping sequentially through the semi-structured questionnaire with the interviewee whilst permitting the conversation to be led by and developed by the interviewee.

Detailed rough notes were made during the course of the interview and these were transcribed directly after the interview into the final case study report by the interviewer to maintain the best levels of accuracy possible.

Initially it was intended to seek to produce audio recordings of the interviews but a number of potential interviewees expressed reluctance to this request and this option was not pursued.

The initial six interviews were conducted with the policy of anonymity for the company. The last nine interviews recorded the company and interviewee details; permission was sought and granted to publish these details for the purposes of the project. Exposing the company websites to scrutiny was seen as desirable.

Occasionally the interviewer took an active part in the conversation to suggest alternative ways and methods of working and sought the reaction of the interviewee; these are recorded in the text.

Background details on the company, such as the premises size, turnover and history were sought and recorded. Details regarding the IT infrastructure, the number of computers, servers, operating systems and type of networks was sought and recorded, as far as was possible.

Company websites were scanned and pertinent details recorded and included in the reports. Photographs of the company premises, products and activities were obtained and published to help in giving an overall impression of the company and the context in which it operates.

Research Results

Surveys

Composite scores were calculated for use of ICT, attitude to problem solving, attitude to ICT, and involvement in business networks. These were calculated as the total score for all items in the relevant section. Participants were also classed as "high" or "low" ICT through their reported use of technology facilities. Businesses reporting use of 3 or more ICT facilities were classed as "high", those reporting two or less were classed as "low".

The overall frequencies of the sample show a skewed distribution in terms of company size. Only four companies had more than 50 employees. The majority (26) had fewer than ten employees. Company sector was slightly more equally distributed. The most common sector was services (17), followed by retail (12), other (11) and production (2). The distribution of both gender and age of employees was normal. The highest frequency of age was 36-40 years while the highest frequency of gender was "50% men, 50% women". The most common number of locations for businesses was 1. The number of employees holding a degree, following company training, having a computer for their own use and having access to email all showed a reverse bell curve distribution. The most frequently cited uses of ICT were email and administration software.

Normality tests showed that no numeric variables were normally distributed.

Non-parametric correlations were conducted to identify any relationships among the section composite scores. This analysis showed that all composite scores were positively correlated with the exception of attitude to problem solving and use of ICT. Involvement in business networks was strongly and positively correlated with attitude to ICT (.513, p = < .01) and attitude to problem solving (.510, p = <.01). Moderate positive correlations were also found between network involvement and use of ICT (.350, p = <.05). Attitude to ICT was strongly and positively correlated with attitude to problem solving (.557, p = < .01). A very high positive correlation was shown between attitude to ICT and use of ICT (.671, p = < .01).

The data was then split into groups of "high ICT" and "low ICT" for further analysis. The division of data into groups by sector or size was not possible due to the skewed distribution of these variables. 22 participants were classed as "high ICT" while 20 were classed as "low ICT".

The "high" ICT group participants were most commonly found in the "services" and "other" sectors while the "low" ICT group was more likely to be in the "retail" sector.

The two groups were similar on measures of size, number of locations, ratio of men to women, average age and number of employees following company training. Unsurprisingly, the "high" ICT group displayed higher levels of having computers for their own use and having access to email. "High" ICT companies showed higher frequencies of employees with degrees and skilled workers than "low" ICT companies. The most common types of ICT used by the "low" ICT group were email and administration software while the "high" ICT group most commonly used email, administration software, presentation software and newsgroups.

The composite scores for the two groups show very little difference in involvement in business networks, both groups showing low involvement. The "high" ICT group shows more use of ICT (mean = 26.91) in comparison with the "low" ICT group (mean = 15.40). This difference is also present in the groups' attitudes to ICT ("high" mean = 28.95, "low" mean = 17.20). There is less difference present regarding problem solving. The "high" ICT group showed a slightly more positive attitude (mean = 30.52) than the "low" ICT group (mean = 25.15) however the gap between these groups is not as pronounced as that for ICT composite scores.

The only cited barriers to ICT use given by participants were expense and relevance to company.

Discussion

The majority of SMEs taking part in these surveys were in the retail and services sectors: this may be a reflection of the proportion of SMEs in those sectors regionally, however, the method of participant recruitment may have affected the sample.

A frequency analysis of the data set showed bimodal distributions in the number of employees holding degrees, being skilled workers, having use of a computer at work and having an email address at work. This suggests that SMEs are roughly

divided into those that "have" and those that "have not" in terms of ICT. It also suggests that SMEs either require/possess academic or vocationally skilled employees, or do not. This could be related to the nature of the business in question.

The participants were measured on their amount of ICT use, their attitude to problem solving, their attitude to ICT and their involvement in business networks. There was a strong relationship present between amount of ICT use and positive attitude to ICT.

A positive attitude to problem solving was not significantly related to ICT use but did show a correlation with positive attitude to ICT. Involvement in business networks was positively correlated with all other three scores.

These results imply that a positive attitude to ICT and the use of it are closely related. They also imply that a positive approach to problem solving and ICT are frequently found to coexist. However, a positive attitude to problem solving is not indicative of a high level of ICT use. The results suggest that business networks are closely related to the positive use and attitude to ICT and problem solving although this relationship should be treated with some reserve as all SMEs scored lowly on network involvement.

The analysis of "high" and "low" ICT groups also yielded interesting results. High ICT was most commonly found in the services sector while "low" ICT was more frequently found among retail SMEs. This may be a consequence of the relevance of ICT to working life. Many of the "low" ICT SMEs cited relevance to business as a barrier to ICT use. It would be logical to conclude that existing ICT facilities are not designed to aid work that is not office based.

The "high" and "low" ICT companies showed few differences in their size, number of locations, men to women ratios, average age and provision of training. These results suggest that there is no relationship between ICT use in SMEs and these factors.

The groups did show differences in their proportions of employees holding degrees or vocational qualifications (skilled workers). "High" ICT SMEs were more likely to employ individuals with these additional skills. This may be due to the nature of work – it would be expected to find higher levels of trained staff within a sector such as services rather than retail.

The findings of this study support previous research showing a low level of staff training in SMEs (Attwell, 2003). It also supports the finding that SMEs make little use of e-learning (CEDEFOP, 2001). No examples of e-learning were given by any participant taking part in the survey. This does not necessarily mean that SMEs do not use ICT for learning. Items used to score level of ICT use included numerous examples of informal learning with technology through the sharing of information. The scores found at composite level would suggest that many SMEs use technology for learning even if this use is not recognised.

The primary barriers to the use of ICT cited were cost and relevance. This supports previous research findings regarding the prohibiting effect of expense on SME e-learning uptake (CEDEFOP, 2001). The relevance of ICT and e-learn-

ing to SMEs is not a subject of frequent discussion in the research community. It is quite logical to assume that many SMEs do not use ICT because it bears no relation to their working life.

Workers in the retail or production sectors might never need to operate a computer, let alone buy one for the purposes of vocational training. The adaptation of ICT to provide practical benefits to a wider range of businesses may increase the use of technology among these SMEs.

Finally, the relationship between problem solving and use of ICT is still unclear. The two factors are not significantly related to each other yet many theorists make the assumption that they are unquestioningly related. Obviously, ICT use does not necessitate a positive attitude to problem solving and vice versa. A good attitude to problem solving has been shown to relate to a positive attitude to ICT. Encouraging SMEs to operate in a pro-active collaborative way may provide the foundations for these companies to advance in terms of both technology and learning culture.

Research Results

Case Studies

The foremost general observation within the SMEs surveyed was: there is no formal learning occurring through the use of ICT.

Computers are used to obtain knowledge but only in informal ways.

Ad hoc learning via material delivered by self directed and just in time use of search engines, predominantly Google, was the majority means of knowledge acquisition. Such knowledge acquired was as a result of an immediate workplace challenge, in response to a need to acquire knowledge in order to resolve issues occurring during the daily execution of workplace duties.

Search-engine use and book-marking of favoured sites occurred but other than in the case of individual IT professionals, there was no evidence of the use of, or knowledge of, advanced techniques of resource management and knowledge acquisition such as in the use of RSS, Wikis, and shared social book-marking.

Before proceeding to a more general discussion of the findings we describe a number of "special cases" of the use of ICT for learning in order to illustrate the range and novelty of individual cases and to offer as a backdrop to the more general discussion.

Members of the 2 IT companies, Semantise and Company E, made widespread use of online user-group forums to obtain knowledge on software bugs and to obtain information on the techniques and practice of their chosen disciplines. Acquiring information online was viewed as established practice and as an essential part of the job of an IT professional. Members of this group not only acquired knowledge online but, to varying degrees, were members of online communities of practice and took an active role in generating online content for general use by the IT community.

The heads of the IT departments of both Austin Taylor and Plas y Brenin exhibited similar use of online resources and may be viewed as individuals belonging to an IT expert grouping.

From our studies it was evident that in the case of the individual IT specialists interviewed continuous online learning was a deeply established practice and, within the rapidly evolving IT industry, an essential skill required in the execution of their duties.

The kiting specialist company, Turbulence, uses freely available online video of professional kite-surfing competitions to extract knowledge of new and novel techniques developed by the competitors. This information is used by the company and by the individuals to train their own 2 kiting teams, Team Turbulence and Turbulence Angels.

In turn, videos of the 2 teams are made by the company and published on their website for general and free viewing.

Kite-surfing has developed an extensive and international community of practice mediated by many hundreds of online kite-surfing forums. The discussions within these forums are often of an advanced technical nature covering component design through to emerging techniques and practice.

The UK national mountain centre, Plas y Brenin, publishes, via their website, online articles on the techniques and practices of the various outdoor disciplines taught at the centre. These articles are generated by their own expert staff and are free to view. The articles are used as an internal teaching resource. This resource is used in an informal way by practitioners of the various disciplines but may also used by those seeking more formal accreditation and certification.

The Real Car Company makes extensive use of eBay to not only buy and sell cars and car parts but to search for manuals and information on antique cars. The company uses online antique car enthusiast forums to both acquire and supply information. There is an active community of practice inclusive of both professionals and amateurs.

The Health Food store, Dimensions, makes extensive use of online materials to inform the sales staff on the characteristics of the health products sold. The product suppliers provide online information as training material including much information that may be viewed as general education along with the product specific information.

Lighting technicians at Theatr Gwynedd and boatyard engineers at Dickies make extensive use of online manuals and product literature to keep informed on new products and the evolving techniques required in the daily execution of their increasingly complex duties.

The examples above serve to illustrate the many and varied ways in which ICT is employed in SMEs. The multi-various and individual ways that SMEs are evolving to exploit the powerful combination of ICT and web access is resulting in a rich and growing ecology of use-models and should be born in mind during the more general discussion.

5. E-Learning in Poland

Andrzej Skulimowski

E-learning is one of the top priorities of the "ePoland" programme. During the first stage of its implementation (2001-2003), it created the basis for the further development of e-learning: Polish educational programmes have been modernised and most schools have been connected to the internet. The programme also places an emphasis on SME training, the training of teachers, creating multimedia information centres and educational content databases (portals, electronic libraries and content repositories). Other goals of the "ePoland" programme related to e-learning on-line content are to assure internet security and the protection of Intellectual Property Rights, and supporting the smooth integration of new technologies and applications.

E-Learning in the Public School Sector

The background for developing e-learning courses in schools was created by the Interkl@sa programme, started in 1998. The goal was to equip Polish schools with computers connected to the internet – over seventy thousand PCs were placed in schools within this programme. The programme created an institutional platform for co-operation between IT companies and schools aiming at preparing young Poles for the use of modern Information and Communication Technologies, providing equal educational opportunities irrespective of the location of the school, and the training of IT specialists. The programme Steering Committee members came from the Ministry of Education, local authorities, teachers, enterprises and NGOs. In co-operation with different partners, including the Cisco Computer Network Academies, Interkl@sa launched a number of sub-projects including "Teaching for the future", "Notebooks for teachers", the Polish educational portal (www.interklasa.pl), European Community information centres, local information academies. Interkl@sa has contributed to an extension of IT courses for secondary schools and municipal educational centres. Following an agreement with the Association of Polish Administrative Districts (Związek Powiatów Polskich) and Cisco Systems, three hundred Local Information Technology Academies have been established in secondary schools and other educational institutions. All beneficiary institutions receive teaching material prepared for Information Technology Academies, as well as access to an internet help line. The Academies prepare young people from secondary schools, graduates and the unemployed for employment as computer network administrators and other IT professions by providing the Cisco Certified Networking Associate qualification.

E-Learning in SMEs

The development of e-learning tools in Poland is promoted by the Polish Agency for Entrepreneurial Development (PARP), the governmental body responsible for the support of the SME sector. There are several barriers slowing down the development of e-learning in companies. One of them is limited access to broadband internet. The second barrier is the lack of educational policies in companies – the efficient use of e-learning systems in companies has to be preceded by a reorganisation of training processes. The lack of sufficient feedback may cause problems in evaluating and selecting training programmes. Over 80% of Polish companies surveyed do not measure the effectiveness of courses attended by their employees. The third barrier is attitudinal: whilst traditional training is seen as an incentive, it is difficult to persuade employees to participate in courses provided only in an e-learning format. An additional barrier to e-learning in Poland is, in some sectors, the limited computer and internet literacy of employees. Despite the barriers mentioned above, the internet is used for training in 46% of SMEs (2004), one of the highest percentages in the new European Member States.

According to the CEDRA survey (2003), and our own research (PBF, 2004), there are three main models for the organisation of e-learning in Polish companies:

In the first, large companies train their vendors, suppliers or subcontractors, while the most common model assumes participation in e-learning courses on specific software or hardware organised by the supplier – usually a large company. This model includes both paid and free courses. SME staff may take part in these courses in order to gain knowledge of products offered by the company and to obtain certification. The participation of SME employees in such courses is usually not an integral part of the SME learning policy. In most cases participation of an employee in these types of courses is a requirement from the supply company. The certificates received by employees are regarded as sufficient proof of new skills acquired. The second model used by companies for e-learning is training in basic product-related skills and workplace Safety (BHP) provided on-line or through the use of CD ROMs. This model is used by over 40% of the companies. Since most e-learning courses related to modern IT products are offered in English, this provides pressure for employers to provide training in the English language. The third model for e-learning in the Polish SME sector is individual employee initiative. Most employees use free English language courses and software courses, due to the availability of such courses on the most popular Polish portals. Notable is the use of Internet based dictionaries and on-line translators.

Generally, according to the survey performed by the PBF (2004), the SMEs plan to expand the range of e-learning courses. They see the advantages of e-learning as:

- easy access to course materials,
- lower costs,
- flexible access (employees take part in courses at the most convenient time, with no necessity to be absent from work).

Future policy development

The official projection of the prospect for the information society in Poland in the middle term is outlined in a document entitled "The Proposed Directions of the Information Society Development to the year 2020", published in late 2004. The document refers mostly to those aspects of societal and economic life directly influenced by state activity. Consequently, the stress is put on public and civic life in the context of the development of the information society and the problem of ICT infrastructure in shaping the overall framework of development. Among the priorities for the development of information society the following areas are highlighted:

- E-government
- E-democracy (the enhanced civic participation in public life)
- Employment policy in the information society
- E-science (the ICT infrastructure in the research institutions)
- E-health (the implementation of ICT in the health care system)
- E-learning
- E-transport & e-tourism.

Infrastructure and Telecommunications

In the context of the ICT infrastructure, the basic forecast is limited to the year 2013. It is assumed that until then the following parameters will characterise the status of ICT availability in Poland:

- The majority of households will have broadband access to the Internet (70% according to forecasts);
- The availability of high speed connections (10 Mbps and more) for 10% to 20% residents of metropolitan areas;
- WiFi and WiMax standards will be available in significant metropolitan areas

With regard to the economic availability of the ICT infrastructure, it is assumed that after the broadband access prices fall below 50 zlotys (12 EUR), the marginal penetration of Internet may reach the level of about 90%, compared with the current rate of about 35%. It should result in internet penetration comparable with the current level of cable TV penetration in Poland. It is stressed that at the moment Poland is significantly behind with respect to the ICT infrastructure standards compared with the average level in the EU. Thus, reversing that situation demands not only the growth of the ICT infrastructure investment, but surpassing the average ICT investment rate in other European countries.

Obviously, the dissemination of all e-services, including public e-government services, e-health and e-learning tools and methodologies, depends on the availability of affordable high-speed internet connections. Entrepreneurs are sceptical of the government's IT policy, specifically internet development in Poland: 52% of Small and Medium Enterprise managers claim that government policy has not sufficiently supported internet dissemination [PARP, 2002]. At the same time they

emphasise the potential role of the government in promoting the use of internet. They point out several measures that the government could take:
– decrease Value Added Tax for Internet Service Providers;
– support the promotion of the internet, e.g. by dedicated PARP programmes;
– improve intellectual property law, especially that related to the web.

In 2003, the Polish Government prepared a programme in response to the needs of entrepreneurs: "ePoland – information society development strategy in Poland in the period 2004 – 2006" (which is an update to 'ePoland', 2001). The strategy described in the programme is targeted at:
– preparing Polish society for technical, social, and economical changes concerned with the information society and with challenges of new electronic markets and methods of work,
– adapting the Polish economy to global electronic economy requirements,
– adapting Polish law to the requirements of information society,
– creating transparent structures of public administration to enable the use of information tools in an e-government framework,
– improving the competitiveness of the Polish economy by supporting innovation in Polish SMEs.

Another key issue in governmental policy is the attitude towards the support of modern teaching and learning media in the public education system and dedicated to SMEs via entrepreneurship support programmes administered by the PARP. The government actions targeted at SMEs will be supplemented by general actions related to the:
– telecommunications infrastructure development (information networks, wireless networks, satellite data transfer and other new telecommunication technologies);
– support for cheap access to extended telecommunication services;
– telecommunication and media market liberalisation.

The reduction of internet access costs is a key issue. This may be achieved by increased competition in the telecommunication sector as well as by offering access to networks through alternative infrastructures, such as cable TV, wireless access, energy lines, UMTS, broadband networks, IP version 6. Legal regulations and speedier action by the Polish Antimonopoly Authority in disputes with the dominant telecoms providers could contribute to an improvement in this situation. Positive stimuli will come also from amendments to existing laws concerned with electronic crime and new laws to assure secure internet connections. The 'ePoland' strategy assumes close European co-operation in these developments.

E-learning Prospects in Poland

In the area of education, the "ePoland" programme priorities related to e-learning are as follows:
– the modernisation of Polish educational programmes,

– the provision of schools at all levels with computer systems connected to the internet,
– the training of teachers,
– the creation of multimedia information centres and educational databases (portals, electronic libraries, educational content servers).

The stimulation of internet use for e-learning will be accomplished by the following activities:
– the promotion of Polish culture through the internet,
– access to electronic information in the countryside,
– the introduction of electronic signatures and electronic payment tools.

Activities supporting SME participation in the electronic economy will be undertaken in parallel. The assumption of the "ePoland" programme is that SMEs will become involved through the provision of access to telecommunication services. Future e-learning systems developers should take into account the process of convergence of telecommunication and information technology with radio and television. Digitalised radio and TV provide access to data, whilst broadband networks can transmit data, voice, and video. The expansion of broadband internet, UMTS and the emergence of multimedia platforms joining radio, TV, PC, and phone will make a transition from e-learning to m-learning possible. Mobile e-learning systems will increasingly replace paper based learning materials.

Human resources managers are increasingly interested in education based on ICT technologies. In their opinion, most companies are watching the development of e-learning systems and trying to fit them to their needs. These companies would like to implement systems for e-learning. According to WiedzaNet, during the next two years 70% of its clients will buy IT courses, 20% will order individual e-learning applications connected with clients' products, whilst 10% will be interested in courses connected with practical, everyday work skills. Since 2003 more than half of their clients have been SMEs.

The market for distance learning systems in Poland is rapidly developing. Although large and medium-sized enterprises first understood the advantages of such systems, the e-learning products will rapidly be spread to over one million Polish SMEs. This rising interest is connected with the growing level of their information technology infrastructure. The number of companies which develop IT infrastructure sufficient to implement e-learning systems will be the decisive factor in the implementation of e-learning systems. Market development will be driven by the diverging needs and priorities of institutional and individual clients. Since institutional clients need to deliver homogeneous information to a (small to large) number of employees as quickly as possible and at a low cost, the characteristics of e-learning tools for this group of clients will differ significantly from today. Individual learners are often looking for courses that end with a prestigious diploma, which may help them to gain a better job. Furthermore, individuals will be interested in courses that will not interrupt their work and disturb their private life. In both cases e-learning tools will be designed to meet clients' needs.

Likewise, SME-targeted products will have to consider SMEs specificity and be available at much lower prices than today. We estimate that e-learning market value in Poland in 2004 amounted to over €15 million and that this market will grow at the rate of 50-70% during next 3-5 years. In a short time e-learning has evolved from being just a fashionable novelty and will become an important element of the emerging e-economy.

6. E-Learning in SMEs in Spain

Nick Kearney

This chapter describes the findings of these the ICT and SME project research initiatives in Spain, focusing especially on the survey, the case studies, the policy interviews, and the focus groups.

Research Methodologies – The Survey

Research Objectives

This research focused on training and the use of new technologies. In this context, we aimed to identify the principal barriers for existing SMEs in the use of e-learning in continuous training with the objectives of designing training models that are appropriate for the needs of these companies and establishing a framework for the development of appropriate policies that will improve the competitiveness of these companies both at regional and European level.

To achieve these objectives, we examined in depth the situation of SMEs with respect to the use of ICT and training needs. For this purpose we carried out fieldwork, described in detail in this section.

Design and Selection of the Study Sample

The first part of the process involved the selection of the group of companies to be studied. The SABI database, which contains information about 615,000 Spanish companies and 80,000 Portuguese companies, was used. This database is useful for macro-economic studies, sector ratios, market research, sector positioning, benchmarking, and microeconomic studies of any combination of entries, or ratios that may be pre-established or user-defined. SABI financial data come from the commercial register and public sources (BOE, BOP, BORME).

Two criteria were established for the selection of companies. The company had to be located in the Valencian Community, given that this was the area of study. It had to be classified as active in the "status" field. This eliminated all the companies that were classified in this field as bought out, bankrupt, inactive, dissolved, filed for bankruptcy or disappeared.

Using these first selection criteria 69322 companies were identified. The companies were then classified by economic sector using the classification of the National Census of Economic Activity (CNAE). The CNAE sectors selected for our study were the following:

– 29 - Machinery and mechanical equipment manufacture industry.
– 31 - Electrical machinery and materials manufacture
– 50 - Sales; maintenance of motor vehicles/-cycles; retail sales of motor vehicle fuel
– 55 - Hotels

– 63 - Activity associated with transport. Travel agencies.
– 65 - Financial intermediaries, excluding insurance and pension plans
– 66 - Insurance and pension plans, excluding obligatory Social Security
– 67 - Auxiliary activity related to financial intermediaries
– 73 - Research and development
– 74 - Other business activity

Following this filtering process, the number of companies dropped from 69322 to 6631. Two more selection criteria applied. The most recent year for which accounts had been published should be at least 2002. The company should not be involved in a range of specific activities. This was because these kinds of company appear and disappear quite rapidly in many cases and it was therefore decided that we would be less likely to receive responses from these companies. To make optimal use of resources, the following companies were therefore excluded: bars, cafeterias, restaurants, farms, service and petrol stations, leisure, photography, rural land management, tyre repair, food distribution, driving schools, carpenters workshops, telephone services, ceramics, lamp manufacture, cycle and motorcycle repair, textiles, construction.

This process left a total of 4000 companies that fulfilled the requirements, and the total was understood as a representative sample for the study. A questionnaire was then sent to all these companies by mail (although, as is mentioned later, in some cases data was gathered by personal interview as well as by fax or mail). Valid responses were received from 55, which is 1.4% of the total population. This implies a margin of error of +/- 13% in the sample, working with a significance of 0.05%.

Design and Creation of the Questionnaire.
A questionnaire that had already been created in a previous stage of the project by other members of the consortium was used. This was revised to ensure that it covered all the information necessary to fulfil the objectives.

The questionnaire, once translated, was presented to experts from the business and university environments, all of them with considerable direct experience of both training and new technologies and their opinions were requested. This process allowed us to deal with some errors of comprehension and complete certain questions. The final version was then sent to the companies participating in the project. The translation and revision process took place during the month of March 2004 and mailings began during April of the same year.

Field Work.
The field-work involved the following sub-phases:

Mailing of Questionnaires and Follow Up
Once the sample and the definitive questionnaire were available, questionnaires were mailed with a presentation letter addressed to the management of company.

After two weeks telephone contact was made with some of the companies to confirm the arrival of the questionnaire.

Information Gathering
In this phase of the study information was gathered from the questionnaires. In all the cases and where it was possible, a personal interview was carried out with the manager of the company, however, in 90% of the cases, the questionnaire was sent to us by mail or fax, or directly using e-mail. This phase was carried out between April and June 2004. As we have commented previously, answers were obtained from 55 of the 4000 companies that made up the sample.

Statistical Data Processing
Once the information had been gathered, the next stage began. This involved the transfer of the answers to the questionnaires to hard disk and the statistical processing of the data in order to obtain the information required. This processing was done using the statistical application SPSS 11.0. SPSS is a statistical data analysis application facilitating the management of the information obtained from the results of the questionnaires. To carry out the analysis it was necessary to draw up a data matrix in which to store information for later analysis. More than a hundred variables were created to cover all the options involved in the questionnaire and all the answers given by the companies that made up the final sample were entered. Finally, each of the questions in the questionnaire was analysed in detail with the aim of obtaining an accurate view of the subject being researched.

Data Analysis
The last stages of fieldwork involved the analysis and evaluation of the results. The analysis of the data began with a descriptive study, both univariate and bivariate, in which the distribution of the sample and those questions and aspects relating to the use of ICT and training and companies were analysed. An extensive series of lists, tables and graphs of the data compiled were created. Different variables were analysed separately and in combination, and in this way sufficient information was gathered to reach the conclusions of the study that are presented in this report. To be specific, the different techniques used were frequency analysis, measures of central and dispersion tendency, cross tabulation, Chi-square tests, and other indicators of relationships between variables (correlation coefficients and Anovas).

The Case Studies

The case studies constituted the qualitative part of the study undertaken in the project. The object was to analyse the particular situation of a range of SMEs using a semi-structured interview. These interviewees were usually company managers or personnel managers. The basic structure of the interview consisted of the following sections:

– General information about the company.
– Work organisation.
– Production processes and ICT.
– Learning culture.
– Formal learning.
– Informal and individual learning.
– Networks and innovation.

The interviews were transcribed and then analysed by the interviewers in order to identify conversational units, categories, words and key sentences. Silent moments and non-verbal communication were also analysed. The process was as follows:
– Structured script
– Recorded interview
– Observation
– Transcript of the interview

Specifically the interview was heard three times by the researcher, read completely three times and analysed by sections.

Focus Groups

The studies that were carried out in the project in the first stages, the survey and the case studies, formed the basis for the focus groups. The conclusions of the first stages were used to develop a series of questions that were used to structure the discussions in the focus groups. Two focus groups were held during the project, one in the second year just after the survey and the first seven cases studies had been completed, and the second in the third year after finishing the rest of the cases studies. (It should be noted that Florida, the Spanish partner joined the project at the start of its second year). The participants were experts from different fields related to the subject of the project: public institutions, organisations concerned with training for SMEs and also from the world of e-learning.

Both sessions began with a presentation of the progress of the project so far. Then an introduction outlining the major insights of the literature review, the case studies and the survey was presented. The session was then structured by a series of questions made by the moderator to the participants. In each round of answers each participant was able to contribute to discussion and comment on the reflections of the other participants.

These questions began with the definition of terms, and especially the term e-learning and what the participants understood by the term. The following questions asked the participants to reflect on the relationship between the learning and SMEs, and then the final questions explored the principal results of the project so far and focused especially on possible solutions to some of the problems that had been encountered.

Policy Interviews

The following people were selected for interview.

- Francisco Sanchez Osorio, Head of Research at the Tripartite Foundation for Training and Employment, a state organisation based in Madrid which manages, plans and finances company training throughout the country.
- Miguel Salavert, General Director for Industry at the Valencian Ministry of Business, Universities and Science.
- Joaquín Vañó, General Director of training and Professional Qualifications and the Valencian Training and Professional Qualifications Agency, of the Valencian Ministry of the Economy, Taxation and Employment.
- Miguel Angel Rodriguez Muñoz, Manager of Human Performance Consultancy, Price Waterhouse Coopers Spain.
- Patricio Antonicoli, European Confederation of Woodworking Industries, Brussels representative

This group of interviewees covers a range of perspectives relating to policy in this area in Spain; national and regional organisations that fund training are represented, as are the relevant areas of the regional government. Other participants represent the perspectives of a large European business confederation with a considerable number of SMEs, and the vision of a large consultancy firm that has a global vision of the SME context.

After selecting the group of policy makers to be interviewed these were contacted and information about the project and a list of questions was sent for their consideration, before organising the date for the interview. A semi-structured questionnaire was used to for the interviews. After the interviews, which were recorded, the recording was transcribed and analysed, a report compiling the different conclusions of these interviews was then compiled. The results are summarised in the next section.

Results

Survey Results

The main conclusions of the survey were as follows:

- There was a majority of medium-sized companies as compared to very small and large companies.
- There was a majority of companies in the service and manufacturing sectors followed by the retail sector.
- In most cases employees work in one particular location within the company premises.
- The percentage of employees with university or vocational training in companies analysed is low.
- The percentage of employees that undergo training organised by the company is very low (around 20%).
- A high percentage of employees are not provided with a personal computer in order to carry out their job.

- A high percentage of employees do not have a company e-mail address, and this is a fact that confirms the low level of penetration of information technology in these companies.
- There is a predominance of male workers over female workers in the sectors we analysed.
- In the majority of companies the average age of the workers is between 36 and 40 years old (51%).
- The ICT tool that is most frequently used in these companies is e-mail, followed by management applications (word processing, payroll and accounting programs).
- Video-conferencing, discussion forums and newsgroups are scarcely used in the companies we analysed.
- Although the percentage of companies that seldom use ICT for communication within the company is high, more than 55% use ICT frequently.
- External communication using ICT is more usual, both for communicating with people from other companies, and with suppliers and clients and other professionals. However, its use for communication with associations is less frequent.
- ICT is seldom for the training of employees in the company (around 57% of companies described this).
- These companies considered ICT a useful tool for work.
- A very high percentage of companies (around 60%) use ICT tools for Internet information searches.
- These companies encourage their employees to keep themselves up to date by going on training courses, although they also consider that daily work practice and already gives them sufficient opportunity to do this.
- The changes taking place in their environment and the necessary response and adaptation to these changes are considered an opportunity for the professional development of their employees by these companies.
- A high percentage of companies (almost 60%) stated that the assessment of employee skills is an important part of their policy.
- In general, training is an aspect that concerns these companies although they do not have a large budget for this purpose.
- The companies considered that teamwork is very important in the solution of problems. Furthermore, they encourage their workers to use new technologies to look for, collect and share all the information available with colleagues using new technologies. However, the companies were not in favour of the sharing of information with people outside the company.
- The companies considered that computers are necessary in order to do work satisfactorily, although an important percentage recognised that not all their employees have access to this tool.
- Although computers are considered necessary for daily work, there are still a high percentage of employees who do not have the sufficient training to use them.

- Not all companies consider that their employees are motivated to use Internet or e-mail, perhaps due to lack of necessary knowledge.
- A significant percentage of companies (almost 50%) stated that their employees do not use the Internet daily.
- Companies considered that they should give more support to the development of their employees' professional skills.
- A high percentage of companies (around 38%) not only do not want their employees to share information with other colleagues in the profession, but also are not in favour of asking for information from other companies in the sector or local networks. On the other hand, they also consider that many of the companies in their sector or local networks are not in favour of sharing this information either, not even using ICT.
- A significant percentage of companies (around 45%) consider that companies and local networks play an important role in the development of training in the sector, both in ICT and other areas of knowledge.
- Practically all the companies have enough hardware and software to be able to use ICT appropriately. Furthermore they consider that their Internet connection is satisfactory and that their employees have enough time to use them appropriately.
- More than 50% of the companies have sufficient experience in the use of ICT, as do their employees in the context of information searches using the Internet.
- The majority of employees ask for help from the colleagues on the need to solve problems related to the use of new technologies. It may be, for this reason, that some companies consider that they do not need the help of an ICT expert.

Case Studies Results

The most significant findings and issues that arose from the case studies were as follows.

Some companies were very positive about both training and ICT. However the use of ICT in work was not always matched by its use for learning, although there appeared to be an awareness of a need for this. In some cases there was an awareness of the potential of ICT but also of the limitations. In some companies both ICT and learning are seen as investments, and training as a mechanism for improvement and stability. The use of e-learning in general could be described as incipient in this type of companies which were characterised by reflexive forward looking management generally with a business culture that is not dissimilar to that of larger companies.

The other kind of company, generally more traditionalist, exhibited a lack of interest in both ICT and learning. Learning cultures were weak and use of ICT was limited to business focused uses, where it was present. In some cases, lip-service was paid to the idea of training but on examination it became clear that little was being done. Often, in these cases, the weakest use of ICT was among

the managers and it seemed likely that generational issues were having an effect, at least in terms of familiarity with the potential of ICT technologies. As might be expected there was no use of e-learning in these companies.

In all cases, gender differences were not seen as important though in one company it was noted that women were more resistant initially to training but became more applied once they began a training course.

Overall we see a range of attitudes to learning, from disinterest to partial interest, to a full commitment to training and learning as investment. Equally there is a range of ICT use, from low to average to strong integration.

A range of approaches to the role of training was also identified, from management driven with explicit policies, to circumstance driven by customer needs, and situations where there was little interest.

E-learning is little known or used. One company found it a distraction; another used it extensively (the supplier relationship was important here). Others know the benefits of e-learning but do use it yet, though in some cases it is being considered.

Informal learning is unrecognised or seen as "experience", mentoring takes place in some companies, but few structure it explicitly. ICT is not used to scaffold mentoring..

In general there is a split between forward-looking SMEs with a modern business vision (4 of the companies fitted this description) and passive traditionalist companies, (two of which were actively resistant to use of ICT and the provision of training) in the use of ICT and learning culture.

Focus Groups Results

The Definition of E-Learning

The opinions expressed by the participants ranged from definitions that understood e-learning as developing out of distance learning to other opinions that stressed the development of the concept towards the term *blended learning*. This was given extra emphasis by the participants who focused on the change from a vision of e-learning as materials and documents and other resources that are sent to the student using Internet to a vision of e-learning involving interaction. It was stressed that although the industry focuses on materials, procedures and products, the focus should be on people.

In the first group, there was a discussion of who should be responsible for training: the company or the individual? Opinions differed, and the representatives of SMEs in the group emphasised that the cost to SMEs of training in both resources and time makes a company that does training less competitive. They emphasise the need for state aid. Other participants pointed out that if companies want to be more competitive they need to use new technologies and that this should be part of the company's objectives. However the SME participants felt that this should be done on employees' time. It was also pointed out that this debate is not really a

debate about e-learning and more a debate about training as a whole. The debate then focussed on the question of motivation and the need for appropriate training to be offered as well as for technical infrastructure. Motivation was seen as low because most training is similar, standardised and not very personalised. It was pointed out that when e-learning is done properly and the workers are motivated it could be very successful.

The second group focused on the importance of informal learning, for example using Google, as part of e-learning. However, equal emphasis was given to the complete lack of knowledge in SMEs of the subject whilst it is clear that the use of ICT for learning can be successful even in target groups where there is a profound lack of knowledge of the medium (use in indigenous groups in Mexico was mentioned)

It was also emphasised, as in the other group that unless clear benefits are shown SMEs will not adopt this kind of learning. The participants identified this as a pedagogical problem and pointed to the need for appropriate pedagogy in this context. Furthermore, it was pointed out that this is really not a problem of e-learning, since e-learning is just one more of a range of options, but that motivation and success are clearly related to the presence of a tutor. The choice of approach, whether it is collaborative online learning, self learning online or face-to-face training, is the question of the particular context and the kind of learning envisaged. It was pointed out that the competitive atmosphere in many SMEs is not conducive to collaboration or community-based approaches to learning. However the distributed nature of the internet could help SMEs, usually in direct local competition, to collaborate to share knowledge across distances.

SME Learning Culture

The main question focused on the difference between formal and informal learning processes and to what extent the latter were recognised. The participants recognised that informal learning is of considerable importance in this context. It was noted that in many contexts employees may undertake training outside their working hours. This may have nothing to do with the needs of the company or with improving competencies needed for daily work. These people were seen as focusing on the university environment because it gives prestige, whilst informal learning does not have this recognition. Until the qualifications obtained in the company-learning context are recognised, whether they be formal or informal, the situation will not change. The SMEs participants pointed out that this is a question that depends on both the company and the worker. Other participants noted that it is not always necessary to provide direct training. Sometimes indirect incentives can be effective in helping employees train. However this was seen as difficult in some cases because the only real incentive available is economic and promotion is not often feasible in SMEs.

In the first group, it was further observed that there is a crisis in the traditional sectors and that companies need to reinvent themselves. This involves re-qualifying

their workers. There is a need for more qualified workers, requiring the training of workers in competencies and the recognition of those competencies. However it was pointed out that when did you talk to companies in these terms they often do not understand the idea.

The last consideration in this section was that motivation continues to be a problem, not just in the learning culture in SMEs but in general society. There is a problem with the educational system. The key to the solution of this problem in a lifelong learning context is in companies. A company needs to be capable of making training part of its strategy and of motivating its workers to improve professionally, in other words viewing training as an investment. However, it was observed that this is not just a problem of costs but also of time, and that it is often simpler to take on younger people who already have the necessary training.

The participants in group 1 went on to identify other barriers to learning in SMEs. These included the short-term orientation of most SMEs, and the bureaucracy and paperwork that is often involved in publicly financed training. It was also observed that the public institutions often do not know what competencies workers within a particular company require.

The second group focused especially on motivation as a key element in the learning culture. This included the need for accreditation; other issues included the possibility that there may be cultural elements involved with a resistance to online learning because it is seen as "too cold". Particular emphasis was given to the idea that time is a key issue in SMEs and is perhaps the principal obstacle to any kind of training, and that the theoretical flexibility of online learning does not solve this issue, it simply displaces it.

The Use of New Technologies in SMEs

The general opinion was that the new technologies are not being used to their full potential in SMEs, the principal use being accounting. Furthermore, in general, new technologies are seen as a cost rather than as an investment and they are not trusted. Some companies do not provide access to the Internet or use the Internet because they are not sure whether it is safe for them to do so.

Age was another factor that was identified as problematic. Currently most managers do not use new technologies. It is the generation leaving university in the 1990s and later that do have this training. The SME workers pointed out that there is a considerable problem for SMEs in this context since, although it is clear that there is a relationship between productivity and new technology, it is difficult for SMEs to make the most use of it and they need support from business associations and other organisations. The present tendency is to employ a consultant.

The Use of New Technologies for Learning in SMEs

In this section emphasis was given to the distinction between transferable training, training that forms part of a CV and can be used in any company, and specific training which a company needs for its particular activity and is usually not trans-

ferable to other contexts even though it forms an important part of the competitive advantage of the company. In the context of transferable training, companies should co-operate in training provision. Specific training is like made-to-measure training, which, taking into account the costs of production may not be of interest for learning providers. At this point it was emphasised that awareness campaigns and financial aid are needed and the role of local development agencies and the public administration were emphasised.

The conversation went on to focus on what kind of e-learning would be most acceptable in this context. The participants pointed out that e-learning is very much in its infancy and that traditional organisational structures lack of support and experience, lack of vision regarding e-learning, lack of human resources and of acceptance by users, traditional industrial processes and organisational situations and the time required for training are substantial obstacles. It was felt that the ideal model would probably be a mixed model in this context.

The second group focussed heavily on the ways in which learning - and especially e-learning -could be promoted. The issue of time and the fact that SMEs live for the moment mean there is a need for more support from associations and greater flexibility. The participants identified the need to change the way training is financed and pointed out that this is starting to take place although there still are considerable obstacles to greater flexibility. The training culture has not yet developed despite efforts to do so and to a certain extent the existence of subsidised training is an obstacle to SMEs developing training for themselves. The competitive nature of most markets now means that staffing is at a minimum providing even less time for training activities. Anything that is not an absolute priority and bringing quick results is usually postponed.

However, the participants also noted that much as yet unrecognised informal learning is taking place. Emphasis was placed on the role of associations and other intermediate organisations in articulating change. Presently this is not working particularly well. These associations should function as multipliers but this is not happening in the case of e-learning. In some cases there is a reduction in e-learning in SMEs. SMEs that have implemented e-learning programmes have not repeated them. This implies that the models used were not appropriate.

Results of the Policy Interviews

Though the interviews were structured according to a semi-structured interview format, the conversations were wide- ranging and covered a variety of areas.

With regard to the current situation relating to learning in SMEs a range of different pre-occupations was covered. An initial consideration that several of the interviewees raised was the diversity of the SME sector, in which there is a wide range of approaches and sizes. One interviewee particularly focused on two different types of SME: he identified a group of traditional SMEs, which are often family companies. These are conservative in outlook and resistant to change.

Then, on the other hand, there is a range of SMEs more modern in outlook, and participate effectively in associations and make the most of the opportunities afforded by collaboration with others. However, this interviewee did recognise that the second type of SME is a minority

The interviewees identified a wide range of obstacles to learning in SMEs, principal among these is that SMEs are not agile in this context. They are often short-staffed and have little time to dedicate to activities that are not a priority. Lack of staff is an obstacle in itself but staff turnover is also an obstacle in that the SMEs are unwilling to train staff that may leave, which means that the investment is not effective even if it does take place. Related to this is the bureaucracy involved in accessing public finance. SMEs have neither time nor human resources to manage this process. The administration was seen by many as rigid and not adapted to the needs of SMEs. Furthermore it was recognised that current levels of grants are insufficient for SMEs to undertake a large amount of training. It was also recognised that this rigidity on the part of the administration is not a problem that can easily be solved since public money is involved and this will always require checks and regulations. Some differences were found with regard to obstacles, in that while some interviewees maintained that there is little interest in learning in SMEs, others maintain that, whilst there is interest in learning, the prioritisation of other activity, and the need for SMEs to focus on the day-to-day running of the business, means that they rarely finish the training that they begin. The problem is that the general attitude to training is operative rather than strategic.

Other obstacles identified involved cultural questions. Many SMEs see education and work as separate and the idea of lifelong learning is a new concept that many have not fully assimilated yet. In general there is a lack of learning culture, and training is seen as a cost rather than as an investment. This leads to problems in motivation and these are exacerbated by the fact that many learning products are inappropriate either due to their methodology or the content. Most providers use standard products that do not adapt to the specific needs of SMEs, and many e-learning methodologies lack the crucial figure of the tutor, felt by many SMEs to be a vital element. Interviewees identified a need for specific content that focuses on the key SME groupings in Spain, hotels, transport, commerce and tourism. The principal problem is that the providers are happy at present to focus on transversal subject matter, which is often too general to be of use to SMEs.

Another problem is the question of qualification. However this is not simply a question of providing a piece of paper. It was emphasised that it is necessary for a qualification to have value if it is to be a factor that aids in choosing a particular type of training.

Interviewees also identified critical success factors. Training in SMEs should be easily transferable to daily activity and it should be possible for managers to see rapid results from training. While this is clearly related to the short-term focus of many SMEs, it has to be recognised that this is a reality that is difficult to change and should be taken into account in planning training. However, it was recognised

that changes are taking place and that there are an increasing number of SMEs that see value in associations and in having a strategic vision, and these SMEs do ascribe value to continuous training. The interviewees furthermore pointed out that there is a range of finance available in Spain from different public administrations, at regional and national level, and that these organisations are focusing not only on financing but also on creating networks to support different sector needs and provide relevant content. Research is being undertaken and there is awareness, at all levels in the administration, of the problem, although it is recognised that clear-cut solutions have not yet been found. With regard to the current situation regarding SMEs and e-learning, the interviewees identified a series of specific obstacles relating to learning. These included a distrust of e-learning as a second level kind of training, a range of bad experiences often due to irrelevant or badly adapted methodologies or content and a range of preconceptions about this kind of learning that had been spread by word of mouth between companies. Related to these obstacles there is a general lack of contact with and usage of ICT, and this is a generational problem; current managers of SMEs, in their 40s and 50s, are not users of ICT. The interviewees pointed out that the coming generation will not have the same characteristics. Currently, though ICT is used in a wide range of SMEs, the focus is on office-based applications for uses such as accounting and stock control, the use of ICT for learning is largely absent. Another obstacle identified or suggested by the interviewees was a question of culture, and interviewees suggested that are there may be a preference for face-to-face training as it is seen as more "human" and perhaps that the Mediterranean culture is not receptive to online interaction. Other interviewees pointed out that the issue is more a question of the need for people to be involved in the teaching-learning process, much of what has passed for e-learning has been self study material, largely irrelevant in terms of content and using a methodology that does not include a tutor as part of the process.

However, the participants also emphasised that the potential of e-learning is important for SMEs, given that it provides a flexibility that could overcome the incompatibilities created by time considerations, there is a potential for providing training at a lower cost and for providing training that has more appropriate methodological approaches that have been seen up to now.

All of those interviewed had been involved in actions to promote e-learning in different ways, with varying degrees of success. In some cases, this was the promotion of actual e-learning initiatives, and in others the focus was more on studying barriers to access to e-learning in SMEs and the creation of networks. These networks now exist but need extending. Problems identified in these processes included the problem of equating e-learning methodologies with face-to-face contact data, particularly in the case of asynchronous solutions where the number of hours (the key measure in defining grants for training) is not easy to gauge. In general there was agreement that e-learning, though it has potential, needs special promotion and this needs the involvement of all the actors in the SME context including the administration, company, associations and unions.

The last section of each interview focused on possible future actions and solutions. These can be divided into three main areas: methodology, legislation and government action, and the role of associations.

In the context of methodology, it was emphasised that there was a need for methodologies focused more on experiential learning rather than classroom paradigms. The view was, there needs to be more attention paid to informal learning processes and mentoring and how learning takes place in these contexts. Issues relating to the relevance of the learning and how learning and innovation interact need to be considered. There was a general feeling among the interviewees that it is not so much a question of e-learning as of learning and that therefore perhaps we should „drop the e". It was pointed out that it will take time for e-learning providers to stop focusing on the largest transversal products and look to the SME market. With regard to legislation, it was agreed that the public administrations need to focus on helping SMEs access learning, but it was emphasised that this is a question not just of money but also of creating effective networks. It is not a question simply of financing but also of promoting appropriate ways of approaching the problem and these include the need to guarantee quality (both due to the distrust of technology in the sector and because this will help to overcome the problems caused by short term vision).

In the context of associations, several of the interviewers emphasised the need for more effective groupings to take place, and for associations to make clear to their members that they understand their problems. There is also a need for support and better information to ensure that SMEs do not base their decisions purely on word-of-mouth contacts.

As a last consideration, it is important to emphasise that there was a feeling that the kind of change needed will probably be a generational change, something that is coming in the Valencian region as the Internet generation start to take up the reins.

Summary of findings

ICT and Learning in SMEs

The general conclusions of this process of policy-maker interviews with regard to the current situation support the findings of other research processes within the ICT SME project. Principal among the obstacles identified were the following:

- SME priorities and the lack of time and human resources
- Learning is not valued or given recognition,
- Lack of a learning culture.
- Many learning products and especially e-learning products are not appropriate methodologically or in terms of content, for the SME context.

Organisational and policy issues
Current policies and public administration actions were considered to be moving in the right direction. Funding is available, however SMEs find it hard to access and more work needs to be done in that area. Other current initiatives include research in this area, and the creation of networks, though it is recognised that although these networks exist they need to be extended.

Conclusions of the ICT SME Research in Spain

The principal conclusions of the research can be summarised as follows:

Learning Culture
There are two types of SME in this context, the first have a modern vision of business and a medium to long term view and regard learning as an investment, the second more traditional businesses focus exclusively on the day to day running of the business and see learning as something that is of little use unless it solves an immediate problem. Lack of funds and more importantly lack of time is clearly an issue, but are not the only issues as the lack of uptake of funding initiatives is also a problem. These companies focus more on experience, although their descriptions of this showed that what they were describing was informal learning. It is clear that much learning takes place in the SME context, but that in many cases it takes place informally and most of those interviewed did not appear to be aware of it as learning.

Use of ICT
Many SME workers do not have access to ICT as it is not considered necessary for their work. This is clearly a key barrier to e-learning, both in terms of access and familiarity with the tools. Furthermore, where ICT is present, as it is in many contexts, the principal uses are for management and administration and email. In general ICT is not seen as a tool for learning. However much it may be used for information searches and similar activities, this kind of informal approach is not understood as learning. This picture of ICT use is of importance in explaining why only 4% of companies provide e-learning with any frequency.

E-Learning
Those that are aware of e-learning are in general willing to recognise the theoretical advantages, both geographical and temporal, of using ICT for learning and training in the company, however this does not translate to adoption in practice, due to a range of reasons. In some cases this is because they have not had time to do so though they are considering it, in others because the e-learning solutions available are seen as inappropriate and in other cases because of uncertainty about the possible quality. In still other cases there is simply no knowledge of this option.

Recommendations

The research process, and particularly the policy interview phase, has produced a series of possible recommendations for future action. Most of them aim in the same direction as current actions that are already taking place. These include extending and supporting SME networks and ensuring that all initiatives are supported by a consensus of all the actors involved, including public administrations, unions and business associations.

It is also clear that e-learning requires explicit promotion by all these bodies, and that better information is required and, particularly in the case of business associations, it is necessary for them to be more proactive and supportive and in closer contact with their SME members. However, prior to e-learning there is clearly a need to raise awareness of and increase support for all kinds of learning, since in many cases this is the key issue.

With regard to e-learning itself the key recommendation which arose in both focus groups and policy interviews was that current content and methodologies are inappropriate and that newer approaches should be sought that use the potential and the flexibility of ICT to exploit the more experiential and informal learning processes that take place in SMEs.

7. E-Learning in SMEs in Sweden

Cecilia Katzeff

An examination of the literature review on learning in SMEs reveals a great amount of sources on learning in organisations in general. However, very little research has actually focused on learning in smaller enterprises. In a thorough literature review, Florén and Tell (2003), conclude that research on SMEs and learning is in an early stage of growth. Research in the area is still built on primary empirical research and there are no obvious core groups of researchers publishing in the field that are frequently cited. Although Florén and Tell (2003) may identify a trend pointing to an increasing interest in applying a focus on learning in research on small businesses, they recognise that learning is still treated as a variable within the study of, for example, marketing and strategic planning in small firms. Empirical studies of learning per se in small businesses are rare.

The reality and day-to-day conditions for SMEs differ substantially from those of large enterprises. For instance, SMEs have limited budgets for learning and professional development, and a completely different learning-and work culture (Cedefop, 2002). In this study, data is presented on challenges and barriers to learning and professional development and e-learning in SMEs in Sweden.

SMEs in Sweden

In order to provide a background on SMEs in Sweden statistics have been retrieved from the Swedish Agency for Economic and Regional Growth (http://faktabanken.nutek.se/sb/d/210/a/577). According to the statistics for 2004, more than 99 percent of all private enterprises in Sweden are SMEs. Up to 71 percent of Swedish enterprises are one-person businesses. About one million people in Sweden work for companies with less than 20 employees, 500,000 people for companies with 20 to 200 employees and only 600,000 are employed in companies with more than 200 employees. SMEs in, the service sector alone, employ 875,000 persons, 62 percent of the total number of persons employed in this sector. In 1998, 80 per cent of the value of the Swedish exports originated in large companies. But 98 per cent of Swedish exporting companies employ less than 200 persons, and account for one fifth of the total export value. Many small enterprises are suppliers to the larger export companies.

- 99% of all enterprises have less than 50 employees.
- The proportion of small enterprises (0-49 employees) in Sweden is about the same as in other comparable European countries.
- Small businesses are responsible for a large amount of employment within the private sector. About 40% of people employed within the private sector work in businesses with less than 50 employees.

– Almost 80% of all enterprises in Sweden belong to the service sector. Barely 20% belong to the industry sector. Most enterprises in this sector belong to the "finance and company services" sector, followed by "commerce, hotel and restaurant".

At the end of 2004, there were about 625,200 enterprises in Sweden. This number does not include enterprises within agriculture, hunting and fishing, public enterprises and businesses. The number of enterprises in these sectors is unknown.

This chapter reports on the work carried out by the Swedish partner, the Interactive Institute, on the Leonardo da Vinci ICT and SME project. Data from a business survey, interviews with SME managers and employees and with policy-makers and planners, and focus group meetings are summarised and analysed.

Methodology

Data Collection

Data was collected through four different complementary methods and contexts. These were a survey of SMEs, interviews and case studies in SMEs, interviews with policy makers and discussions in focus group meetings.

For the survey data was collected using a sample of 300 addresses, of which 100 were micro-enterprises, 100 were small enterprises and 100 were medium sized enterprises. E-mails were sent to 235 companies providing a link to a web-based questionnaire. This resulted in 35 completed questionnaires. Three had to be deleted (resulting in a total of 32 forms), since the companies were larger than 250 employees. For the case studies, micro and small and medium-sized enterprises were selected for interviews to follow up the survey in more detail. Policy interviews were held with people representing different areas of national initiatives to support the learning and use of ICT within SMEs in Sweden. Finally, focus group meetings were held in order to examine the particular conditions of SMEs in general in Sweden and their particular situation concerning learning, education and use of ICT.

Survey, Questionnaires and Interview Guidelines

As instruments for collecting data, a questionnaire for the survey was constructed and interview guidelines were developed for the case studies and policy interviews.

The questionnaire for the survey included 58 questions. Items were grouped in sections covering the following topics: background information, use of ICT within the company, frequency of use of ICT for specific purposes; attitudes to problem solving; attitudes to ICT, business networks and barriers to the use of ICT. Items were scored as either multiple-choice answers or on a Likert scale of 1-5.

The interview guideline for the case studies contained open questions concerning the following topics:

1. Background
2. Work organisation
3. Production processes and ICT
4. Learning culture
5. Informal and individual learning
6. Networks and innovation

Interviews were held with 1-3 people in the enterprises, with the intention of gaining as rich information as possible.

The purpose of the policy interviews was to gain a general overview of what is done to address the situation of SMEs in Sweden in relation to learning with ICT. Questions were posed concerning:

1. The present situation of SMEs regarding learning and development.
2. Experience and skills related to SMEs learning and development, e.g. which methods for supporting e-learning in SMEs they consider more effective than others.
3. The future situation of SMEs in Sweden, for instance how the introduction of e-learning in SMEs is supported in Sweden, how this has bearing on future activities and the division of responsibility for learning.

Analysis

The data has been analysed in an iterative way, using a grounded-theory like approach. In order to arrive at a manageable set of data, data from the four sources has been used to describe a thick description of the perceptions on ICT and workplace learning in SMEs in Sweden.

Results

The Learning Culture

The learning culture in SMEs in Sweden seems characterised by two main factors: a focus on ROI (Return on Investment) and the educational level of the manager of the company. ROI is a focus for all activities and this has to be considered when addressing SMEs' competence development. All activities require immediate pay back for investment and if learning shows to be a fruitful way of increasing business it will receive investment. But if the benefits of learning cannot be directly identified it will not be paid for. Employees are needed for the day-to-day business.

The education of the manager is crucial for the learning culture because it will influence the attitude towards learning and education in general. Companies with employees with a high level of education also have strong cultures of learning. Managers are positive about learning and employees are motivated. The survey revealed that in only one sixth of the 32 companies, more than 80% had a college or university degree. In 50% of the companies, less than 20% of the employees had a college or university degree. According to interviews with policy makers, many SME-managers have negative experiences of learning from school and therefore have formed a negative attitude towards education in general.

Results from the case studies indicate that there are differences in the importance assigned to up-to-date knowledge in their business area. For knowledge intensive SMEs, accurate and up-to-date knowledge is crucial for the very survival of the companies. So is the use of ICT. In SMEs lacking a strong learning culture, training and learning are often regarded as the responsibility of the individual. In order to support SMEs learning and enhance the general attitude towards learning, it is important that policy makers learn about the specific conditions for the company and direct and formulate support accordingly.

The Organisation of Learning

SMEs smaller than 50 employees rarely have a formally documented policy for competence development. Likewise, training budgets are rare. Employees in SMEs report that they may be allowed to take a training course if it can be shown to be beneficial for the business. In general, individuals have to take responsibility for their own learning.

Formal Learning

Formal learning refers to learning taking place within an educational institution or training context. Formal learning is planned and goal oriented. The survey shows that companies, generally, did not follow formal training courses. Interviews with SMEs in the case studies indicate that formal learning may occur if special needs in particular subject fields arise, e.g. marketing. As an alternative to formal training, employees may attend seminars, especially if their company represents a business where formal courses are not yet developed. Participation in seminars is also a good way to get in touch with other people having similar interests.

According to the policy interviews, the most serious obstacles to learning and development in SMEs are the lack of time and the inability to see the relationship between learning and business development. Obstacles do not include costs or technical requirements and prerequisites for using ICT. Showing and demonstrating to SMEs how learning and competence development may improve their businesses might overcome the barriers. The resistance to buying e-learning courses is the same as the resistance to buying face-to-face courses.

Informal Learning

Informal learning, in contrast to formal learning, refers to the kind of learning taking place in everyday or working life. Informal learning may occur intentionally and may be planned. It may also be organised as a form of self controlled learning or through different forms of experience based learning. Participation in networks, coaching, consultancy and mentorship are examples of intentional, informal learning. Although some informal learning is intentional, most of it is spontaneous and unintentional. It usually occurs as a side effect of other activities. Such unintentional learning is an aspect of most human activity and is not usually the object of reflection.

Even though our results indicate a reluctance of SMEs to follow formal training courses, this is not to say that there is a lack of learning in these SMEs. In reality, there is a lot of learning taking place, but the nature of the contexts in which it takes place is not formal. Learning is taking place in the day-to-day business: practical work, problem solving, Internet searches, communication with colleagues, and in communication with suppliers and clients. Employees learn from each other.

The role of ICT in learning

The survey shows that word processors and spreadsheets were used by almost all companies and that presentation software was used by 69% of the companies. Online courses were used in only 6%.

There was a high frequency in the use of ICT based tools for communication within companies (65%), for communication with suppliers (59%) and for communication with clients (62%). There was a low frequency of use of ICT tools for learning and education.

Responses from the case studies indicate that e-learning in the sense of individual online or CD-ROM based training is generally not used. One reason is that the choice of specialised courses in e-learning is too limited. Face-to-face learning is preferred, since important communication with other people is supported. ICT is used for informal learning using information seeking on the Internet. High technology companies use newsgroups for learning.

Views expressed in the policy interviews indicated that some SMEs have negative experience from condescending pedagogic approaches in e-learning courses, resulting in a reluctance to use them. Another obstacle is that many SMEs use slow dial-up modems for internet connectivity and thus are not willing to use web based courses. A third obstacle is that SME employees generally have a low level of educational background and are sceptical of learning. Their learning profiles are hands-on, but this is not reflected in the type of online courses produced on the internet. A fourth obstacle is that the type of individually organised courses that e-learning represents does not comply with the organisation of work.

All the policy interviews expressed a strong emphasis on building personal relationships with the enterprises and thus in creating trust. Without this it is not possible to persuade people to attend courses or to introduce web based education. Finally, the policy interviews reveal a view that a business perspective rather than a technological approach should be advocated to encourage SMEs to use ICT. Sometimes requirements for electronic business may cause a change, e.g. by only accepting electronic invoices an organisation may induce a greater acceptance for the use of ICT in SMEs. The target group should be SMEs smaller than 50 employees. Larger companies have totally different kinds of resources to spend on learning and development.

Technological Infrastructure in SMEs

The low response frequency from the survey probably reflects the day-to-day situation in small enterprises. The survey further shows that:

- In 50% of the companies 81-100% had their own computer at work.
- In 50% of the companies 81-100% had their own e-mail address at work.
- Less than 50% used e-mail for communication, and only 6% used newsgroups and video-conferencing.

Observations from the case studies suggest that the advanced use of ICT and internet access is more likely in newer companies rather than in older companies. The age of the company seems more decisive than the age of its employees. Internal e-mail communication is regarded as an efficient way to communicate with colleagues in the same building. It is interesting to note that the infrastructure plays a role in learning, although the companies might not be aware of this role themselves. For instance, company web sites are sometimes used for learning from clients. Likewise, intranets are used for sharing information regarding common issues, such as information on patients in the health sector. High technology business also uses mailing lists and internet search for business intelligence.

Conclusions and Emerging Questions

To conclude, SMEs in Sweden seldom use ICT for learning in the traditional e-learning sense. The reasons for this include negative experiences of condescending pedagogical models, a lack of courses directed towards specialists, and the missing out of valuable discussions in face-to-face meetings. An e-learning course is not a priority in the daily activities of the company, partly because the type of organised individual learning represented by the e-learning course is not compatible with the way work is organised in the SME.

A general conclusion is that SMEs are a heterogeneous group and this ought to be recognised when discussing how SMEs relate to ICT and learning. Despite this, SMEs seem to have some common characteristics. A very strong characteristic is that they need to see an immediate return on investment. If they are to invest in learning and/or ICT there must be an obvious business focus. Another feature that unites SMEs is that they all regard human relations as a portal to learning.

However, there are more differences between SMEs in Sweden than there are similarities. Obvious differences, which probably influence the way in which learning with ICT is regarded, seem to be geographical location, sector, level of education of employees, the company's age, and age of the company's employees. The impact of these factors upon learning with ICT has yet to be explored. For instance, there is a need for scientific studies to clarify how the particular conditions of a certain branch relate to the particular learning needs of the branch and how these could be accommodated by ICT.

Furthermore, an emphasis is put on the connection of learning/training of the SME with business development. ICT must be viewed as a part of a business

strategy directed at the future. In relation to this the question emerges of how the learning of the individual is related to the learning of the organisation? Does competence development for individuals result in business development?

8. Small and Medium Enterprises in Italy

Elmo De Angelis

The production system in Italy is characterized by business areas. Enterprises operate in well-defined geographical industrial districts; these are commonly called distretti (clusters).

Production is mainly carried out through integrated systems of enterprises that represent the ideal environment where small enterprises have been able to achieve higher innovative and competitive levels.

Industrial districts are an important peculiarity of the Italian manufacturing system, from the point of view of efficiency of the productive processes and the competitive capacity shown by entrepreneurs on foreign markets. Born as a merger between economic and social relations in limited territorial areas, they have initiated and consolidated processes of economic development, characterised by a close relationship between the society and the productive system.

The *major features* of these territorial systems consist of:

- High flexibility and efficiency, both at organisational and productive level
- Reduced costs due to workers availability
- Diffused entrepreneurship
- Innovation as an effect of imitation
- Distribution of production between many enterprises
- Small but highly specialized enterprises
- Geographical proximity
- Sector specialisation
- Close inter-firm collaboration, a dense network of inter-firm relationships in which the enterprises co-operate and compete at the same time
- Inter-firm competition based on innovation
- Presence of a socio-cultural identity which facilitates trust
- Active self-help organisations
- Presence within the area of complementary competencies and skills
- A dense network of social relationships, based mainly on face to face contacts
- Synergy elements (imitation, interaction & co-operation)

Many economists consider that this form of organisation has many competitive advantages:

- density of relations based on reciprocity and co-operation among the entrepreneurs
- widening of technical knowledge
- reinforcement of relations with local authorities and banks.

The majority of the ICT and SME project research has been carried out in the Marche Region. The Marche is a region of about 150,000 inhabitants on the North-Central Adriatic Coast. The area has undergone considerable transformation

due to a consistent population movement to the coastal area, where the level of industrialisation is higher. The region's thriving manufacturing sector is regarded as an unusual and successful economic model both in Italy and abroad, and is based on a widely spread network of very small, family-run businesses.

The region's industrial sector is represented by a number of highly specialised areas and the 50 largest firms work mainly in the following sectors: footwear, domestic appliances, furniture, telecommunications, electrical components and clothing.

Many of these companies have become well known outside Italy. However, most of Marche industry is founded upon small and medium sized family businesses, employing on average only 5.5 people. Around 78% of Marche exports come from the following industrial sectors:

– Machinery 33.5%
– Footwear 28.6%
– Furniture 7.8%
– Clothing 6.5%

In the 1960s and 1970s many firms from other Italian regions and even from abroad settled in the Marche Region, attracted by the low labour costs. They created the so-called "Marche Region Model" based on the capability of acquiring know-how over time and small but continuous incremental innovation.

The Pesaro-Urbino Province's economy is mainly engaged in the manufacture of furniture, Teflon kitchen utensils, aluminium fixtures, textiles and clothing, and fibreglass yachts.

Furniture and engineering are the most significant sectors of the economy, with industrial districts of national and international importance.

Starting from the 1980s, the districts entered an internationalisation phase by opening up to foreign markets such as the European Union, the Middle East, the U.S.A, South America, Eastern European countries and the Far East.

Strengths of the Production System

Italy's "distretti industriali" are inter-connected firms concentrated in a particular geographical location, with specialized suppliers and service providers all in close proximity. What the firms have in common is that they work in the same geographical area and all contribute to a system that produces goods that are characteristic of the district. Cooperation, together with competition, is a feature of Italian industrial clusters.

The greatest advantages of a district based productive system are the following:

- Flexibility, which allows the region's manufacturers to adapt production to the rapidly changing needs of the global market and to survive periods of economic recession
- Quality and Style which compete with the low prices of products imported from Asia

- Management stability due to size dimension (number of employees) but also to direct control on a critical mass of operations tied to information management and utilization system
- A friendly environment, where the cultural, political and social acceptance of the enterprises gives a sort of benign differential compared to firms acting in non-district areas
- Knowledge of all elements of costs and selling prices due to concentration of suppliers in the same area
- Geographical proximity which facilitates the formation of trust networks, with firms linking to each other to form synergetic and complementary resources
- Strong buyer-supplier linkages
- Speed of circulation of idea, information and know-how within the cluster
- The presence of a common culture, values, languages and technical knowledge

The integration of social context leads to the development of a strong sense of identity: the workers feel part of a successful productive system, which is not only the source of their income, but also the image of an entire community that shows entrepreneurial abilities and reputation at a national and international level.

Weaknesses of the Productive System

The weakness of the production system in the Marche region is as follows:

- Asian companies are producing goods that are cheaper and sometimes exact copies of those manufactured by Italian companies.
- The small size of the companies is generally a strong characteristic of the so-called Marche model but could sometimes be a weak point in terms of the limited number of professional managers and the chronic lack of financial resources.
- Low profit due to competition
- Lack of trained staff
- Delays in ICT innovation and marketing
- Lack of facilities.
- A tendency to imitate competitors rather than innovate through investment in Research and Development.

Most of the companies in this area have spontaneously created networks without explicit coordination, recreating the conditions that characterize the development of the Italian districts. Many entrepreneurs are looking to alliances and co-operation as the only opportunity to maintain their position in the global market.

The consolidation of SMEs also involves organisational changes and more attention to human resources development, supporting Life Long Learning to train staff in order to deal with rapidly evolving technology and new market demands.

A key challenge for the future is co-operation between SMEs to share the costs of innovation in technology, design and quality.

Method

Data Collection

Data was collected in four different contexts: a survey of SMEs, interviews with SMEs, interviews with policy makers and discussions in focus group meetings.

The survey was sent to about 3000 SMEs by e-mail, fax and post. Only 69 companies returned the questionnaire (2,28%). The survey included companies throughout North and Central Italy, but most of the returns came from SMEs located in the Marche Region.

The list of SMEs was provided by local Associations of SMEs; these were contacted by telephone to provide further information and explain the reason for the research.

The survey returns include SMEs located in t4 regions (Lombardia, Marche, Abruzzo, Friuli Venezia Giulia) and the Republic of San Marino.

The SMEs which returned the questionnaire are from the following sectors:

- Retail (1 company)
- Services (25 companies)
- Production (32 companies)
- Other (4)

The size of the SMEs range from less than 9 to more than 250 employees, with the majority between 1 and 50 employees:

- 9 or less employees 24 companies
- between 10 and 50 employees 24 companies
- between 51 and 250 employees 14 companies
- more than 250 employees 1 company

The policy makers who have been interviewed were selected for their activities and experiences with training and education or ICT in SMEs. Representatives of various policy institutes were selected, based on their commitment to regional development programmes, policies, innovation and social-economic sustainability.

Organization / Department	**Function**
Training and Employment policies of the Marche Region	Councillor
Consozio Formazione & Lavoro – Vocational Training Organization	Director
Confartigianato of the Province of Pesaro and Urbino – National Association of SMEs	Director
University of Urbino – Faculty of economics	Researcher and lecturer on ICT and development of enterprises
ISFOL – Experimental training	Technical researcher

Organization / Department	**Function**
Training and Employment Policies of the Province of Pesaro and Urbino	Councillor
CNA Marche – National Association of Artisans	Responsible for training and employment policies
MCE – Software development and commercial strategies for SMEs	Administrator

The 15 SMEs for the case studies have been selected in accordance with the sample prioritised by the project (IT, Tourism, Services, Mechanical engineering) operating in the industrial districts of the Province of Pesaro and Urbino and the Republic of San Marino. Enterprises were chosen because of their innovative products and processes, and positive strategies for HRD and marketing of products and services to clients.

Focus groups meetings were organised with key national actors: directors of training centres, public officers responsible for training and employment policies, representatives of trade unions, directors and representatives of associations of SMEs, experts in e-learning, university researchers, SME consultants and employees of SMEs.

Instruments

A common questionnaire for the survey was created by the project partnership and interview guidelines were developed for the case studies and policy interviews.

The questionnaire was divided into the following sections: background information, use of ICT within the company, frequency of use of ICT for specific purposes, attitudes to problem solving, attitudes to ICT; business networks and barriers to the use of ICT.

The interview guidelines for the case studies contained open questions on:

1. Background
2. Work organisation
3. Production processes and ICT
4. Learning culture
5. Informal and individual learning
6. Networks and innovation

The research has been carried out through semi-structured interviews with the staff and management of the enterprises. The semi-structured interviews for policy makers addressed topics of critical success factors and barriers to the use of ICT in SMEs and the policy makers' organisational roles and activities and future perspectives on e-learning within SMEs in Italy.

While conducting the first focus group three main working themes were proposed:

– What is e-learning?

– Why is it very little used?
– How can the initiatives be sustained?

The second meeting had as a central theme the models for the support of professional development of ICT in SMEs.

Analysis

The data has been analysed in an iterative way, using a grounded-theory like approach.

For each of the four data sources, content analysis was carried out based on processes, infrastructure, quality and learner.

Results

The Learning Culture

There are very big differences within SMEs in Italy; influenced by sector, management, IT skills, business knowledge and employees.

In general learning is considered very important but this is not always reflected by the actions of managers. Furthermore, learning in many cases is not actively incorporated into business processes or into the organisation and in difficult economic times, the budget for training is often the first to be reduced or cut.

Learning culture however, is coming back in companies with the launch of an apprenticeship training system comprising of 160 hours training a year, for two years.

Excepting employees with a higher education qualification, motivation for learning appears low.

The management of the company plays an important role in developing a learning culture. The majority of managers do not believe that training is important for their enterprise. If they need new skills it is cheaper and easier to hire workers who have already been trained. If it is not possible to find skilled workers, senior or expert employees train unskilled employees on-the-job. Only in a few companies is formal training organised internally by a Human Resources department. Similarly, only a minority of enterprises are seeking to create networks of SMEs for training.

In other cases, management is encouraging employees to attend external training courses outside working hours.

Level of Education

Employees in the ICT and Tourism sectors seem to have higher education - from Public Schools and Colleges (diploma). Micro companies appear more interested in employing people with a lower educational background.

The Organisation of Learning

Most companies do not have a policy for learning and professional development. In general, small companies do not have a training culture. The size of the companies makes a difference: companies with more than 50 employees are more likely to organise training for employees.

Formal training takes place externally, often with public funding, including funding from the European Social Fund, or is organised by suppliers in specialised centres. Only a few enterprises (mainly medium-sized) are able to organise internal training. Although sector based training is being organised at district level, there remains a fear of sharing training with competitors. Online support for formal learning is almost non-existent. In some cases, CD-ROMs or on-line platforms are used for learning, but mainly in IT enterprises.

In Italy, at present, there is no certification of competences gained from informal learning. However, informal learning is seen as important in many companies. Employees discuss problems in their work with colleagues, mostly in face-to-face meetings. Employees play an important role in providing feedback on work processes. This kind of feedback can lead to changes in work processes.

Informal learning takes place in almost all enterprises studied in the project, although most people are not aware of informal learning as a learning process. Work related problems or issues are discussed during lunchtime or during the work process with colleagues, or with more experienced colleagues (e.g., a master mechanic). Additionally, employees use manuals with technical information to solve problems, and if they are not able to solve a problem, they contact the supplier.

In one case study informal learning was "organized". Company information and data related to design and development, new products, finished products, are made available on the company Web site. Employees are encouraged to access e-learning materials during free time. Times and dates of participation in e-learning are recorded on time sheets.

In many cases, informal and formal learning are connected through apprenticeship programmes. Sometimes this evolves spontaneously, as the senior employee is the most relevant person to ask for help.

The Role of ICT in Learning and Context Issues

It is important to support and promote the growth of a "learning culture" in SMEs and artisan enterprises. In very small enterprises, there is a real need, to create an integrated approach to learning. Small enterprises require more funding for continuous training.

Italian SMEs prefer traditional methods of training: most popular is external training courses followed by seminars, on-the-job training and internal courses.

There is a need to change the focus from training offers to end user needs. If issues related to quality and relevance can be overcome, ICT based learning can meet the need for flexibility expressed by enterprises and employees.

Furthermore, the objectives of the training should be considered. Often enterprises ask for specialised and professional training courses as well as more standard training needs or updating of skills. E-learning is an efficient tool for standard training needs and for professional updating. For other contents, including specialised and professional training courses, there should be a balanced mix between traditional classroom learning and e-learning.

Cost is also important. Non-funded training represents a direct and indirect cost for enterprises. If the cost is too high or the return on investment cannot be quantified, enterprises will not invest in learning. In periods of economic downturn, learning could be utilised for diversification to new products and markets, although this is not common.

The cost of training per hour in Italy is 50% higher than the European average EU. This may explain the negative attitude of entrepreneurs towards learning. The reasons for the high costs include the lack of competition in the training market, the low level of integration within the different sectors of the educational system and the reliance on traditional classroom methodologies.

The case studies indicate regional variation in the willingness to explore new pedagogies and the use of new technologies for learning. The idea of learning to learn is fundamental for research on learning through ICT. This concept is connecting the complex relationships between communication, learning and technology in SMEs.

Technological Infrastructure in SMEs

Technical Infrastructure

A high percentage of employees have access to computer for their own use at work, but few use this for formal learning.

E-mail, together with the use of administration software, is widely used in most companies, but only a small percentage access newsgroups, discussion and message boards or use video conferencing for their business.

The advanced use of ICT and the internet is more widespread in new enterprises than in older established companies.

ICT Related to Work Process

In most companies, ICT is used in the business process for communication with clients, and suppliers to retrieve information and to carry out orders.

Some suppliers promote intensive use of an intranet, especially for order tracking. E-mail is used for internal and external communication. In only a few companies have all employees an e-mail address, in others only managers have access to e-mail. Communication to share or collect information is encouraged in most of the enterprises.

From the business survey, we know that the larger the company the more (different) software is used and more communications happen through ICT. The

more employees have computers available and have their own email address, the more they use ICT for communication and the more positive is their attitude towards ICT.

Policy Interventions

How to Support (E)-Learning in SMEs

In order to support the use of ICT for learning in SMEs, networks are needed, including public institutions, the national government, associations and enterprises, to plan and develop research and innovation in learning and e-learning.

Research should include:

- An ongoing overview of technology innovation;
- The reorganisation of enterprise processes and the development of competences to plan, manage and implement e-learning;
- The creation of high quality training contents;
- The establishment of networks and learning partnerships at national and international level.

It will take a considerable effort to convince entrepreneurs that training is "a must for their own development".

Financial

The key actors in promoting learning and e-learning are policy makers at national and regional levels, although local partners are important for disseminating innovation. It will be a slow process and will not bring immediate results. Present Italian policies are lacking in this regard with training being the first area to be cut in the economic downturn. Reducing the cuts whilst attempting to reduce the cost of training through e-learning offers a potential solution.

Financial incentives to support training and stronger commitments from university, training organisations and sector organisations are also needed.

Quality Monitoring and Legislation

Quality assurance measures have to be implemented outside large enterprises.

Quality assurance could be a motivation for learning in SMEs but this approach must be based on enterprise training needs.

Reflections

The data collected through the project shows that ICT still has a limited impact in SMEs, especially in terms of training and e-learning.

Costs, and lack of a specific training budget, are the main barriers to training planning. SMEs consider training important but not applicable to their own situation. 85% of companies rarely use ICT for learning or training, or encourage employees to attend courses.

Unfortunately, the importance of information and knowledge for growth and economic development for SMEs is not yet sufficiently acknowledged or recognised in Italy. Moreover, continuing education and learning (either traditional or using ICT) are not integral to company planning. There is limited interest in the assessment of employee skills or in the implementation of computer-based technologies.

Lack of ICT infrastructure, together with a limited knowledge of e-learning tools and opportunities, inhibit Informal and Individual learning in SMEs. However, more critical is the lack of recognition of training as key to economic development and competitiveness.

A culture of learning is needed before a culture of e-learning can be developed. Key actors should promote the concept that learning generates value for SMEs.

The differences between formal and informal learning are not widely recognised by the different actors, and enterprises rarely recognise informal learning as a form of learning. If people would be more aware of this form of learning and its strengths, it could be implemented, especially in sectors where much expertise is passed on implicitly. In some sectors 80% of the workers have no qualifications. However, the concept of informal learning is not easy to define and to explain. In a broad sense we "learn" informally everywhere and all the time in our life. If learning is changing, informal learning is life.

A clearer definition of what informal learning means would be extremely useful in order for the actors to calculate the return of investment. The problem is whether informal learning will remain informal once formalised and recognised?

There are many differences between sectors, regarding innovation and the use of ICT (for learning). ICT technologies are more widely used and accepted enterprises where the manufacturing and service sectors are present together in the same industrial district.

There would appear to be substantial differences between SMEs located in cities, in university regions and those located in rural areas

The market position of companies regulates training and learning. A competitive market stimulates learning. SMEs are afraid of losing market share if they do not invest in professional development.

Although we are aware of the differences between sectors and regions, we may say that the main learning need is, generally speaking, to be found in ourselves. The motivations and the interest in the topic to hand will always be the main factor in any form of learning. The shift between the training and. learning culture is important and theoretically widely recognized but we should ask ourselves why this shift does not take place in the real world.

9. Learner's needs and ICT and Learning in SMEs

Elmo De Angelis and Cecilia Katzeff

This chapter seeks to investigate people's learning needs and the use of ICT in SMEs. The analysis is based on the literature reviews, business survey, case studies, policy interviews and focus groups undertaken in the six European countries included in the ICT and SME project.

Method

To develop this study, the following activities were undertaken:
- analysis of international writing and studies on the subject;
- An analysis of the main outcomes of the surveys, case studies, policy interviews and focus group meetings carried out in each country;
- An identification of the ontology of roles and relationships of the actors involved;
- The construction and publishing of the study scheme;
- Content Analysis (with QSR – Nvivo 2.0 software).

The analysis is based on the following data sources:
- 120 literature reviews;
- 90 case studies;
- 40 interviews with key policy makers;
- focus groups with key actors.

The following key roles have been identified: learners, teachers, learning providers, enterprises and policy makers. As with any ontology, the categories represent the point of view of researchers. It provides a grid or construct to analyse the data against a structured domain of interrelated concepts. Any definition must be therefore considered a tool and not as axiomatic truth.

Brief definitions
- Learners are those who attend (or should attend) a vocational training course. A broader definition could be: the people who are interested in taking part in training activities with the aim of improving their own professionalism. Learners can be divided into two categories: employers and employees;
- Teachers are the course trainers or facilitators. A broader definition could be those people who undertake all kinds of activities with the aim of facilitating, guiding and coaching learners. A sub category of the teachers are the teachers of teachers (trainers of trainers);
- Learning providers are organisations that provide vocational training and administrate courses. They may be in the public or private sectors;

– Enterprises may be small, medium or micro in size;
– Policy makers may provide funding to support vocational training and should provide the researchers with an overall vision of the process. The main role of the policy makers is to develop policies to support this process.

These roles may be further specified and can be played by different actors depending on the time and the situation. Sometimes, employees are both learners and teachers (peer feedback, collaborative tasks, community thinking). Similarly employers are sometimes teachers (one-one guidance), at other times they are learners (sector organisations providing courses or using a portal for support materials); at other times they are both learner and teacher (e.g. within networks of companies).

Key actors relationship scheme

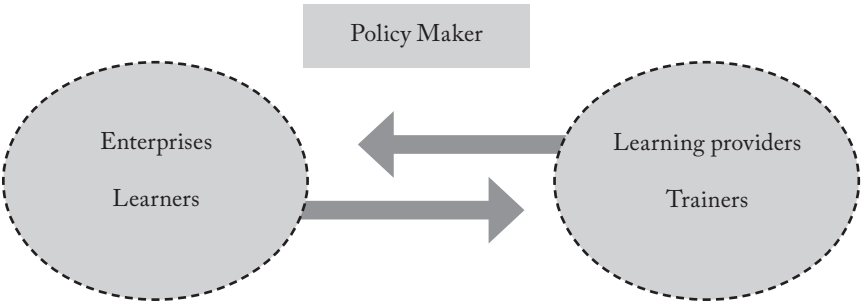

Figure 1: Key actors' relationships scheme

Policy makers appear to be convinced of the importance of training. They recognise the training process as a key factor for success and make the connection between learning and business development. They also see learning to use ICT as a success factor in business development.

In connection with roles, we have also identified a number of factors that impact on the key question of how learning is perceived. The following schema shows the relationship between these key factors. Each factor has a unique identification number that also represents the hierarchical relationship between factors.

Results Organisations: Enterprises

Business Sector

The literature review and previous research show how the SME business sector deeply affects the learning culture of the enterprise.

The background of the employees

"The needs of employees to learn differs within SMEs in different sectors." (NL Focus Group).

"The HRD training budget is limited."

"Back-up resources are limited e.g. work pressure is higher in SMEs than in larger companies as there are less people to do the work and learning possibilities are more easily affected if there is something wrong with some of the employees (illness, unexpected larger contracts)."

In most business sectors there was a legal requirement for SMEs to train their personnel. This is especially true in the food sector.

The ICT sector seems to be the most open to the idea of life long learning, probably because of the high rate of innovation. In the manufacturing sector, training is often carried out because of new machinery and technology. In some countries, like Italy and Spain, and in the manufacturing sector, new equipment and legislation were the only motivation for training, especially in traditional companies. SMEs participating in a supply chain are sometimes forced to train because of the decisions of others in the chain.

When training is highly standardised e-learning seems to be more accepted.

Size

The size of the SME seems to be an important factor for the learning culture of the organisation. Small (micro) SMEs do not have people responsible for learning. In this kind of SME, informal learning seems to be more important although, as yet, unrecognised. There is some evidence in the case studies of an inverse relationship between formal training provision and the importance given to informal, though often unstructured and unsupported, learning processes. Companies with highly structured and focussed training plans tended to place less importance on the informal processes.

"This research shows that learning often takes place accidentally. This is especially the case in small companies (5-10 employees)." (NL – Policy Interviews)

Management

Management behaviour has a key role in the support of learning and e-learning programmes.

"Obviously all these policies depend on the managing director as it can't be any other way." (AV Food - Case Study)

"More successful, qualitative research, based on the case studies, has found that managerial support and a sense of strategic direction have been fundamental in ensuring ICT success in SMEs." (UK – Literature Review)

As learners, managers and those in positions of greater responsibility in general, seem to be more well-disposed and motivated to the use of e-learning. In most cases, traditional face-to-face learning is perceived as better suited to the needs of the enterprise than e-learning.

"We still believe in traditional training. Besides, not all of the workers have an internet connection. We want them to study away from their place of work and to be trained in person."

"Managers do not see ‚added value' in learning." (UK – Policy Interviews)

"The manager has serious doubts about the effectiveness of e-learning (is it well organised?), although the possibilities are recognised." (Pills).

Some managers are negative about training because of the fear that people will leave their company if they gain new competences. In general, the attitude of management, especially in the smaller companies, was seen to be one of the key factors. The more focussed on innovation and development they were, the more likely there was to be a focus on learning and the use of ICT.

People

Generally speaking, learning in SMEs has something in common with adult education. The learners are indeed adults and therefore there is some similarity in learning style. But the context is completely different. Employees learn to become better within their profession and most adults in adult education also want to learn a profession. Employees tend to want direct links with work and adults in adult education want, in addition, background and general education as they want to learn a profession and not just aspects of their profession.

Experience is often counterpoised to classroom or formal learning. It is therefore necessary to consider the following issues:

1. Adults need to be involved in the planning and evaluation of their instruction;
2. Experience (including mistakes) provides the basis for learning activities;
3. Adults are most interested in subjects that have immediate relevance to their job or personal life;
4. Adult learning is problem-centred rather than content-oriented.

"Adults do not see themselves as being in a classroom to study, but as active participants with knowledge and know-how." (IT – Policy Interview)

The Employer

The employer's role is central as a learner and as a provider of training opportunities for the employees.

As a learner, the social setting is important for employers, especially if they are owners of one- person companies. Motivation is, of course, central to the success of learning and seems to be primarily connected with the perception that training fulfils some special need of the employer or the enterprise. When thinking about e-learning it is possible to say that both *"employers and employees have traditional views of learning" (NL – Policy Interview).*

"The respondent questions the need for training and learning in SMEs. Not every company needs learning and training to have a good market position. Only when the entrepreneur foresees advantages, will learning and training happen." (NL – Policy Interview)

"Learning solutions have to be customised to the target groups" (AT - Policy interviews).

"The most important success factors for learning and development in SMEs include

learning about the specific conditions for each particular company – what are their needs?" (Nutek).

This attitude is probably due to lack of information and knowledge about ICT and training and a major gap between entrepreneurs and perceptions of the importance of life long learning.

Often the key issue is whether or not the employer has an entrepreneurial outlook and an interest in developing the company, this ranged from very forward- looking employers to traditionalists.

There were also those who expressed an interest in learning but on further questioning it became evident that their actions did not match with their statements.

Although most of the employers think learning is very important for the company and the personal development of employees, sometimes they refer to cost or lack of time as a reason for the company not offering learning opportunities to the employees.

The average ICT skills among employers are low in some countries (e.g. Italy) and traditional communication media are still used more than the internet.

"Entrepreneurs use the telephone: there are very few entrepreneurs able to use new technologies." (IT – Focus Group)

Often the need for learning is resolved by seeking the necessary skills outside the enterprise. Learning to do something requires money and takes time, whilst asking someone else takes only money.

"Entrepreneurs: always search for immediate answers not for training but for their needs, in order not to waste time and money." (IT – Focus Group)

Costs

The enterprise culture is often not oriented towards learning but is interested in investing in trained human resources and outsourcing. In the present international economic environment, the first cost to be cut is training. Entrepreneurs frequently view learning as a cost and not as an advantage.

"These companies don't have much of a budget for learning." (sector organisation).

"There is insufficient content available and developing e-learning is expensive." (Dutch IT sector organisation)

"When new competences are required, the company may find it cheaper to hire than train especially in SMEs." (ES - Focus group)

From this point of view, it is common to consider online training as a way to cut training costs.

It is interesting to note that although employers often cite cost as a barrier for learning and e-learning, there is strong evidence that even when public funds are available, SMEs choose not to make use of them. However, this can change according to the source of funding. Funding from the European Union or more academic institutions seems to be ignored whilst, on the contrary, there is acceptance of funding from sector organisations.

"As far as SME managers are concerned, the main barrier to both product/service

and process innovation is a shortage of finance."

"However, the survey evidence indicates that the problem is not that firms looking for external financing cannot obtain it, but rather that most small firms do not seek it." (UK – Literature Review).

"During the ESF program (1994-1999) it was noticed that some SMEs (in all sectors) didn't take advantage of the funds to set up real ODL systems for the enterprise, but only to acquire hardware and software, initially used for training and then converted into technology for production." (ISFOL, Rome - Antonio Gallo).

Employees

It is not easy to detail employees' attitudes towards learning and e-learning. Job type, social context, work organisation, and learning culture of the SME and business sector all have a deep effect on the learning behaviour of the workers. Most employees think it is useful to attend courses. However, few employees have a positive view towards e-learning. Fear of isolation and the importance of social context in learning are probably the key reasons why they say they prefer traditional courses to ICT based learning. In a few cases, people have said that ICT based learning is better because they can control when and how the learning takes place. The personal ambition of the worker is often a reason why they take courses during their spare time.

Age

The impact of age on learning behaviour seems to be questionable. Although some results point to a positive correlation between younger people and the use of ICT for learning, the analysis seems to suggest different reasons for motivation and attitudes to learning.

"By age, they stated emphatically that differences don't exist in the attitude to learning and that some of the most important members of the enterprise are people whose age is above the average. A statement which reveals an underlying assumption that in general the young are more motivated to learn." (AV Food).

"Men and young people, and those in positions of greater responsibility, are perceived as more well-disposed and motivated with regard to training." (ES - Case Studies).

"Age is not a factor that influences the motivation of employees to use new technologies such as Internet or e-mail." (ES - Survey).

However, in some cases the level of familiarity with ICT and hence with e-learning was cited as a difference between generations.

Education

The level of previous education has a profound affect on motivation and attitudes to learning. Employers believe that highly educated employees are more positive about courses than employees with lower levels of previous education.

There is also a strong correlation between the level of prior educational attainment and the attitude to information and communication technology.

"The companies with a high percentage of employees with university qualifications are those that make most use of tools such as video-conferencing, discussion forums or newsgroups or presentation applications. Similarly these companies use ICT for online training more." (ES – Survey)

It must be considered, however, that often the use of ICT is also connected with positions of greater responsibility within the SME. It is not possible, then, to identify why the more highly educated employees use ICT more frequently. A possible reason could be related to the fact they have more freedom to plan their own job and to plan their own learning plus greater responsibility in their work.

ICT Skills

A positive attitude towards e-learning is often connected with confidence in using ICT tools. There is strong evidence that even in SMEs with high ICT use, e-learning is not considered a real option for training.

"In spite of all this, they don't use ICT for training (except in some very particular cases in which they use special forums that are a form of informal learning) because they prefer traditional, tutor led training. There is clearly a positive attitude towards traditional training and a negative one towards e-learning. Their attitude regarding the need for a trainer and therefore traditional learning appears to be informed by a view that e-learning is basically equivalent to self learning, perhaps due to a lack of awareness of the possibilities of ICT, which is more due to attitude than unfamiliarity with the matter, given their use of forums in some contexts." (AV Foodv)

Formal recognition of competence

Another factor that seems to affect the motivation of employees to learn is the formal recognition of competences acquired during training. This is especially true if the training is outside working hours.

"Employees need financial rewards for the training received outside working hours. Even more so when they have family obligations (children) at home." (National Training Centre Pharmacists).

Employers consider the formal recognition of skill differently.

"Qualifications are considered irrelevant, experience is what matters." (ES - Case Studies)

Lack of time

Lack of time is often said to be a reason why employees do not follow courses. This is especially true when workers have considerable home responsibilities (e.g. for child care).

The project revealed this as the main barrier to e-learning in the eyes of both employers and employees. However, this may be seen as not only because of home based responsibilities but due to the requirement that learning directly supports their work activities.

Gender

Whilst the impact of age on learning motivation seems to be questionable, the gender factor seems, according some of the evidence, more deeply ingrained with respect to learning needs.

"With regard to the differences in attitudes towards learning between men and women, they said that they don't exist, but they indicated that the latest requests for courses not related to work were from women, which indicates that they are more active in this respect." (AV Foodv).

"Female employees are more motivated towards staff training." (UK - Case Studies)

However, evidence in this area is not conclusive.

Conclusions

The study we have undertaken suggests a culture of learning is needed rather than a culture of e-learning. Key actors should instigate activities to promote the concept that learning generates value for SMEs. Learners and entrepreneurs are still not familiar with concepts like "support" and "tutoring".

Although our survey points to the importance of informal learning in SMEs, few SME managers are aware of this. Given the importance of work organisation in providing opportunities for informal learning, advice and consultancy to SMEs in how to foster informal learning could be a key future development.

10. The Issue of Quality

Graham Attwell and Nick Kearney

In examining the issue of quality for e-learning in Small and Medium Enterprises (SMEs) it is important to understand the different ways Information and Communication Technologies (ICT) are being used for learning in SMEs. The Leonardo da Vinci ICT and SME project has undertaken an extended literature review, a series of policy interviews, a survey of more than 350 SMEs, focus group meetings and perhaps most importantly, around 90 case studies in the seven different countries. The case studies took place between 2002 and 2005 and were based on a semi-structured interview. The main findings of these studies were as follows.

Formal Training

Education and training policies
Few of the enterprises studied had a formal policy for education and training. Neither did they have a budget for training or was there any individual with formal responsibility for training. This is not to say that managers were unaware of the importance of the skills and knowledge of their workforce. They saw those skills as being acquired through recruitment of skilled staff or from informal work based learning. Most SME managers saw their staff as having a personal responsibility to acquire new skills and knowledge as part of a collective responsibility for the company's profitability and growth.

Limited formal training and learning
As might be expected given the lack of formal training policies, there was very little formal training, either face to face or using ICT. Where formal training was seen as necessary, or where formal training was required for regulatory reason, enterprises tended towards buying in participation in face-to-face courses from public sector education and training providers. Where this was unavailable, private trainers were used and selection was on reputation obtained through word of mouth.

Attitude to formal qualifications:
Few of the enterprises were greatly concerned with formal qualifications, other than in those limited areas - such as in the restaurant and food industry - where formal qualifications were a regulatory requirement. Previous experience was seen as much more important. One enterprise said they did not even look at qualifications on an application form but relied totally on job interviews. All of the SMEs had strong involvement in informal sector and/or geographical networks and these networks were often the source of new recruits, rather than job advertisements and formal recruitment procedures.

No accreditation of learning:
None of the employees in the enterprises we studied had attempted to claim recognition or accreditation for the skills and knowledge gained through informal learning. It is not clear if this is because they are not interested in pursuing further formal qualifications or if it is because they are unaware of any opportunities of claiming accreditation for informal learning.

Informal Learning

Much informal learning
In contrast to the paucity of formal learning provision in the SMEs we studied, there was a great deal of informal learning taking place. From our study most informal learning appeared be learner driven, rather than planned in conjunction with others in the enterprise, and was problem motivated, although some learners were motivated by their own interest rather than in response to any specific problem. In many cases ICT was being used as part of this informal learning. The main means of ICT based learning was Google key word searches. Managers were often unaware of this learning, although they were frequently aware of the problem inspiring it. There were considerable differences in the use of ICT for informal learning between different enterprises. It would be tempting to ascribe these differences to age, sector, size or occupation but it is hard to discern such causal factors from the case studies undertaken.

Work organisation a key factor
The major causal relationship that appeared was the link between work organisation and the use of ICT for learning. ICT was most frequently used for learning in those enterprises with flatter hierarchies and more devolved decision taking responsibilities and in which employees had greater autonomy in the organisation of their own work. Interestingly, these enterprises also tended to have a more experienced workforce and low turnover of employees. Conversely, hierarchical work organisations tended to have the least use of ICT for learning. In some cases only managers and administrative staff in these enterprises had access to computers and the internet. There was no evidence of any organised support or informal learning – either face-to-face in the workplace or on-line. However, in some enterprises the learning acquired was discussed with peers as part of everyday collaboration and team-work.

Use of ICT

Much Use of Information and Communication Technologies
The use of ICT in the workplace varied according to sector, occupation and region, SMEs were using computers extensively in their day-to-day business operations. Users of ICT included:
– For administration and accounting

– For business to business transactions (including trading through e-Bay)
– For customer communication
– For advertising and promotion
– For stock control and logistics

From our interviews it would appear that the use of ICT in SMEs is increasing, particularly for e-commerce and for business to business transactions. A number of the enterprises felt they were not exploiting the web as fully as they should and were planning further activities in this area. The particular areas of concern were that whilst the web was being used for business-to-business transactions with suppliers, few of the enterprises were themselves offering sales or services through e-commerce. A number of the enterprises also felt their web sites to be amateurish and offered little functionality.

No General Shortage of ICT Skills

In general, SME managers did not perceive of any shortage in ICT skills in the workplace. They appeared of the viewpoint that younger workers especially had sufficient ICT skills to meet enterprise needs. However, two enterprises referred to problems in updating their web sites due to lack of skills.

E-Learning

Apart from a notable minority, few managers or staff in the SMEs we studied was aware of the potential or possibilities of ICT for formal learning. Indeed only 4% responded in the survey that they use it regularly. Few had received any information from public bodies in this area. Although some had received advertising material by post, this had been seen as junk mail circulars.

Concerns over Quality

Though quality in the context of e-learning has only in recent years become a subject that is widely discussed and explored, as early as 1995 Dick commented that "Quality and design of e-Learning courses, however, are sometimes compromised in an effort to simply get something up and running."

There have been many expressions since then of concern over the quality of e-learning, and these have focussed on a variety of different aspects. For example, many educators and researchers have voiced concern over the lack of rigorous evaluation studies of e-Learning programs (see for example Arbaugh, 2000; Howell, Saba, Lindsay, and Williams, 2004; Lockyer, Patterson, and Harper, 1999; Robinson, 2001). McGorry (2003) adds, "although the number of courses being delivered via the Internet is increasing rapidly, our knowledge of what makes these courses effective learning experiences is limited". The American Society for Training and Development said in 2001

> *"Although recent attention has increased e-learning evaluation, the current research base for evaluating e-learning is inadequate. Due to the initial cost of implementing e-learning programs, it is important to conduct evaluation studies."*

Other aspects commented upon, focused more on academic and pedagogical issues. For example, the literature reveals a distressing gap between the use of technology and sound pedagogical models (Khan 1997; Salmon, 2000; Willis 2000). Several researchers have written about the need for quality standards to ensure the academic integrity of e-Learning programs (Benson, 2003; Carstens and Worsfold, 2000; DeBard and Guidera, 2000; Salmon, 2000; Speck, 2000). A Cedefop study entitled "Quality and e-learning in European training" (2003 and Massy, 2002) revealed that, in a survey of 433 teachers and trainers, 61% of respondents from the public and private sectors indicated they felt the quality of e-learning was fair or poor.

Issues In The Quality Of E-Learning

There are many issues to be addressed when considering the quality of e-learning:
- Is e-learning effective?
- In what contexts?
- For what groups of learners
- How do different learners respond?
- Are there marked differences between different e-learning systems and platforms?
- Does the socio-cultural background of the learners make a difference?
- How important are localised learning materials?
- How important is support for learners?
- Is there a positive return on investment?

Whilst research had cast some light on a number of these questions, much remains to be discovered.

In general, there have been three main approaches to quality in e-learning. The first can be termed accreditation (and certification) where the concern is to provide guarantees of the quality of a particular learning service to third parties. The second is quality assurance, where the focus is on ensuring that the processes a particular organisation claims to carry out are in fact carried out, in other words, that the organisations comply with a set of standards and criteria, which are pre-defined either by itself or some external body. The third, and perhaps most important, but also the most challenging, focuses on the process of learning itself.

Accreditation

Accreditation has traditionally worked in a number of different ways. The first is to accredit different training providers. Training providers have to meet certain standards in order to be "kitemarked" or accredited. In most regulatory systems they are not allowed to provide training without such accreditation. In many systems accreditation is required in order to receive public subsidies for training provision. In non-regulatory systems, accreditation may be seen as a competitive advantage.

This system poses a number of questions. The first is who should be the regulatory body. In Germany, for example, in the SME context, regulation is provided through the Chambers of Commerce. In the UK, with a weaker regulatory system, regulation is provided through the funding mechanism.

The second and perhaps more critical issue, are the criteria for accreditation. Often, as in the Greek KEK system, accreditation appears largely to be based on availability of resources, such as buildings and infrastructure. Where accreditation is more dependent on teaching and learning processes, this usually focuses on the qualifications of the trainers. Inspection systems, although perhaps more thorough, are expensive and difficult to establish.

A second and common system of accreditation is to accredit course provision. Once more, organisations are allowed to provide certain externally approved courses and qualifications as long as they meet certain standards and criteria. Many of the same issues apply as to the accreditation of organisations; indeed the two approaches are frequently combined.

The third approach is to measure quality through the accreditation of individual learner outcomes. Traditionally undertaken through examinations or testing, more recently and especially in vocational education and training, there has been a movement towards measuring competence. Competence is seen as an individual ability to perform a task or series of tasks within an occupational domain or area.

Obviously an approach based on individual achievement in a particular course does not guarantee the quality of learning per se. Fairly obviously, it ignores the impact of prior learning and takes little or no account of the background of the learners. However, it may provide broad indicators.

Quality Assurance

Definitions of quality assurance vary. It can be seen as meeting or conforming to predetermined specifications or standards, to value for money or to fitness for purpose. As Whiteley (2001) observed, however quality is defined, quality assurance in education has become an all-embracing concept that includes all policies, processes and actions through which the quality of the education provided is developed and maintained.

Within e-learning quality assurance through standards may be seen to have two different meanings.

Firstly there is the attempt to quality assure learning, delivered through ICT, by standardising the processes and products of learning. Typically this has been through adherence to International Standards Organisation (ISO) benchmarks. The problem with this approach is that learning provision may meet all the standards in terms of processes and procedures but the learning experience may still be poor. In fact it is quite possible to imagine a hypothetical series of processes and procedures that that are disadvantageous from a learning point of view (but are adopted for example for economic reasons); in the world of ISO, as long as the organisation carries out these processes and is audited as doing so, then it can

be certified. Unfortunately ISO makes no value judgements about the processes. Indeed it is questionable whether this kind of purportedly *neutral* quality approach, which is heavily influenced by its industrial origins, can really be of use in evaluating quality in learning contexts.

Secondly, there is the move to assure e-learning through compliance with technical standards set through the various IEEE and IMS standards organisations. Standards include the SCORM, LOM and Learning Design standards. These standards, which often explicitly affirm their pedagogical neutrality, tend to make glaring assumptions about the way learning should be approached, and to see quality in e-learning in terms of the functionality and usability of the technology. Neither of these approaches fundamentally addresses the quality of the learning experience.

The process of learning

A third approach is to examine the quality of learning processes. In terms of ICT supported learning this means examining the effectiveness and appropriateness of learning as well as what was learnt. It also involves examining the contexts of learning and the applications of learning. One approach to evaluating learning processes is through evaluation (It is important to note that there are some terminological differences over the meaning of the word *evaluation*. In continental Europe the term evaluation is often used to describe to what we have referred to here as assessment. For the purposes of this document, evaluation refers to holistic judgements of quality, not just to assessing learning outcomes).

Quality and E-Learning in SMEs

The research undertaken in the ICT and SME project revealed little awareness or use of formalised quality measures for e-learning in SMEs. Though of course, managers are concerned as to the cost effectiveness of any investment in training, be it e-learning or traditional classroom based provision, there was little evidence of an awareness of how to evaluate the cost effectiveness of a particular training action.

Where there was formal provision of e-learning programmes (and this occurred in few of our case studies), then quality measures tended to be dependent on funding requirements. However the most frequently cited "quality measure" for both traditional and ICT based training was "word of mouth" reputation!

As we explained in the introduction, the main findings of our study were the prevalence of informal learning over formal course based learning. To this extent, accreditation is rendered largely irrelevant as a quality measure, since informal learning is currently not generally considered for accreditation, though initiatives like the e-portfolio may have potential for this in the future.

Quality assurance approaches may be more valuable in allowing an exploration of opportunities for informal learning in the workplace, particularly in regard to

work organisation. They may however, due to their focus on aspects other than the learning itself, serve at best as indirect indicators. The learner is not an industrial product, rather his or her understanding is continuously evolving over time and this clearly also affects his or her perception of the nature of quality over time. Quality must therefore be understood as a dynamic element and it is likely that the static pre-defined nature of accreditation and quality assurance approaches will at best provide only partial insights. In this view, the quality issue clearly acquires a challenging complexity, it is however a complexity that should not be shied away from.

From a research point of view, we would be particularly keen to explore approaches to quality based on quality of learning processes. Far too little is known at the moment about informal learning and how it impacts on working processes and knowledge development. Quality measures focused on informal learning have the potential for transforming working and learning processes. Action research based processes might be a useful avenue to explore.

This background indicates the importance of focussing on the issue of quality. Defining these quality standards, however, can be challenging. In a qualitative study of 13 participants from six different stakeholder groups engaged in developing an online degree program, Benson (2003) found that although everyone wanted quality courses, stakeholders brought different definitions of quality, which impacted the planning process and shaped the learning experiences. Despite the concerns being expressed there is little consensus of what constitutes quality in e-learning. Furthermore, there has been very limited consideration of how the particular forms of the use of ICT for learning in Small and Medium Enterprises might shape stakeholder definitions of quality.

Scope And Issues

As we have seen the question of the quality of e-learning is problematic and fraught with difficulties. These difficulties are compounded when it comes to examining the quality of the use of ICT for e-learning in SMEs. As we have stated, the central issue is the fact that so much of the learning that takes place in SMEs is informal. The nature of informal learning is elusive and this poses further challenges in the context of quality. Ranges of issues arise.

Issues relating to e-learning

The development of e-learning products and the provision of e-learning opportunities is a rapidly expanding area of education and training. Whether this is through an intranet, the internet, multimedia, interactive TV or computer based training, the growth of e-learning is accelerating, albeit more slowly than initially expected. However, wider uptake of innovative approaches to training has been limited by the shortage of scientifically credible evaluation. Whilst some have been searching for new answers to the question "What works and what doesn't

work?" and looking for ways of improving the quality of learning processes in e-learning, the response by a large sector of the community of e-learning developers and practitioners has been a growing preoccupation with software and platforms, and evidence of a confusion (though this is common to all education) between qualifications and learning itself. There has been only limited attention to pedagogy and learning. The scepticism expressed by many SMEs with regard to training, and as part of it, e-learning, is perhaps related to these questions, a recurring preoccupation was with the lack of evidence that training initiatives were producing tangible useful results of any kind. While it should be observed that the SME tendency for preoccupation with the short-term may in itself be an obstacle to certain kinds of learning, these is an objection that needs to be addressed and is clearly related to the quality of the learning itself. In a sense the only criterion for SMEs is whether the learning process has made the learners more able to produce results for the company.

Issues relating to ICT and SMEs

If there is a limited amount of research involving the evaluation of e-learning in general then it is even more so when it comes to e-learning in SMEs. Our own research suggests the problem in developing reliable sampling for quantitative surveys on e-learning in SMEs and the need, in order to identify the real roots of the problem, to use qualitative research techniques does bring with it limitations in terms of the number of cases that can be studied. In addition to this, samples tend towards respondents who are already in some way involved or interested in the subject thus distorting the survey findings. The research we have undertaken through the Leonardo ICT and SME project has suggested that there are considerable differences in e-learning take up in SMEs according to sector and to size. If approaches to e-learning differ by sector it is likely that perceptions relating to quality will also differ accordingly.

One of the major findings of the ICT and SME project has been that whilst there is little evidence of widespread use of ICT for formal learning in SMEs, there appears to be growing use of ICT (intentionally or not) in some sectors, as a tool for informal learning. If this is so then any approach to quality – or certainly to evaluation – of the use of ICT for learning in SMEs may need to consider how to evaluate the quality of informal learning, in which the learner is the final arbiter of when, where and how learning takes place. Research is lacking in this area.

In search of quality

There is widespread recognition that quality is a major issue, by academics, by the e-learning industry and by policy makers. SMEs are largely silent on the matter. As we have mentioned previously, from the SME point of view, the 'proof is in the pudding' and quality is not seen as especially relevant except in the most forward-looking SMEs who either see it as a possible marketing tool, or as a way

of "tightening their ship". Indeed in our research, as can be expected given the range of different approaches mentioned earlier, there was sometimes confusion as to what we meant when we asked about quality.

Vested interests and related views on quality

From a policy makers viewpoint quality is seen as one of the four major priorities for the European Union e-learning Initiative which has funded a series of projects on the topic, The "Capitalisation report on the Leonardo da Vinci I programme ", one of the biggest sponsors of innovative e-learning projects in European VET, identified the lack of systematic evaluation as being the major weakness in e-learning projects. From this point of view quality can be understood as principally about communicating the value of the learning that has taken place. This is perhaps a moot point in SMEs, where the distance between the learner and the decision-maker is shorter, and the results of the learning action more transparent. Many within the e-learning industry, developers, content vendors and content developers would also recognise the issue of quality. However, there is little if any consensus on how the issue should be approached. The industry group, which lobbies on behalf of the major publishers, focuses on content. This issue is important, though by no means as central as is perhaps believed, and therefore requires discussion. The industry group's view is that:

"Where e-learning public policy focuses on the development of low-value, low cost and poorly standardised nuggets designed by amateurs or service providers as promotional material, with limited public commitment or support, there is no incentive for publishers to heavily invest in the production of quality editorial content. However, there has been a growing demand for quality assurance for digital pedagogical content. We are firmly convinced that the best way to achieve quality assurance for content is the editorial process, which should be stimulated so that commercial success can nurture a virtuous development cycle."

How should SMEs approach quality

In a fast developing area there is no one single answer to the issue of quality of e-learning for SMEs. In this paper, we will next take a look at the (admittedly limited) empirical findings from a Cedefop study and from the ICT and SME project on quality. We will go on to examine a number of different approaches to quality from recent and on-going projects. Finally, we will consider some of the implications for policy.

The Cedefop survey

This survey was undertaken mainly with training professionals working at a European level and proficient and confident in the use of the web. Access to the survey was through a European institutional web site.. In the Cedefop survey respondents were asked to indicate how important they considered 11 different criteria for evaluating quality in e-learning.

Jane Massey says, "The criteria provided in the questionnaire covered four dimensions of quality – technical, credibility/reputation of provider, intrinsic qualities, and issues relating to the recognition of eLearning as a means of training (Massey). The results suggest that except for 'Functions technically without problems across all users', which was clearly given the highest priority by the greatest number of respondents, intrinsic quality and issues relating to the recognition of eLearning as a means of training are the two most important dimensions. Other technical characteristics and those relating to the credibility/reputation of provider are overall rated less important. This reflects clearly the interests of respondents – European training professionals and the broader training community in Europe. It also reflects," says Jane Massey, "changes taking place across the world of training, with values shifting away from traditional expectations of what constituted good quality - reputation of supplier/institution, prestige of qualification – to expectations about relevance to learning and competence needs, flexibility, richness of experience etc." This is a welcome shift, given our comments in the previous section.

Our findings on SMEs and e-learning

However, our findings from case studies with SMEs are somewhat different.

Firstly there is clearly some divide in interests in qualifications. Whilst individuals may be concerned with gaining a qualification through formal e-learning, in general SME managers are more concerned as to whether e-learning is likely to contribute to the workplace competence of the individual and thus to the profitability and efficiency of the business. Having said that we found very few enterprises that were engaging in formal e-learning. However, we are not convinced that this represents "shifts taking place across the world of training": excepting those systems with formal work based initial vocational training – such as Germany and Austria –few SMEs have ever had a great interest in qualifications for their workforce. I would suggest that outside the more highly regulated countries competence has always been a major concern. This perhaps represents an unexpressed, even unconscious, concern with the issue of the quality of the learning that takes place and the results of our research indicate that among SMEs there is little confidence that e-learning as it is currently presented is likely to provide the kind of quality of learning they would wish for. The vast majority do not use formal e-learning products and "vote with their feet". Some kind of evaluation of the possibilities of e-learning is taking place here, however much ignorance, of the potential of e-learning, may be argued to be a factor.

In a similar vein we are uncertain that "issues relating to the recognition of e-learning as a means of training" are of great concern. It could be said that managers of SMEs are unlikely to know of the potential of e-learning but on the other hand I am dubious that they would be aware of an issue relating to its recognition as a means of training. More likely is that they might see it as a more flexible opportunity for training staff.

The fact that "Functions technically without problems across all users", which was clearly given the highest priority by the greatest number of respondents, is fascinating and a matter of great concern. We have never seen an e-learning provider, large or small, public or private ever suggest to a potential client that an application might not work. Certainly none of the glossy adverts to be found in north and south Europe on bus shelter and public transport or in training magazines and scattered across the internet, still less the hundreds of trade stands at the many e-learning conferences provide a health warning for potential clients. So how are SME managers and trainers supposed to know that e-learning applications are not all that they are made out to be? That training professionals regard this as their greatest concern reveals a grave credibility gap for e-learning but is not seen as an issue for SMEs. Put simply, SMEs expect the e-learning applications to work.

In contrast to Cedefop's findings, we would suggest that "relating to the credibility/reputation of provider" is the most important quality issue for SMEs. SME managers, in particular, rely on networks. They do not see themselves as having the time or expertise to evaluate different e-learning opportunities. Rather they are interested in the credibility and reputation of the provider. Thus, if they have previously participated in face-to-face training from a particular provider and have found that satisfactory they are likely to engage that same provider for e-learning. Furthermore, personal recommendations are of great authority; particularly when they come from within the SMEs networks and sector. "Knowing someone" or "knowing someone who knows someone" who recommends the product is a key factor in the evaluation of its potential quality. Our research indicates that in many SME contexts this word of mouth process is a factor working against e-learning uptake. Stories of failure spread like wildfire, and many express the opinion that e-learning (as they perceive it) is not for them.

In this respect, public education bodies are often at an advantage in being part of the local networks in which SME managers are likely to engage. Of course, it can work against them, if their perceived reputation is poor.

Another factor involved in the selection of an e-learning programme is that in many cases contact with e-learning has been thanks to e-learning provision at a subsidised rate, offered by one of the many EU ESF sponsored providers. Unfortunately EU and ESF evaluation schema take little regard of the quality of provision. This does not promote an interest in the issue among the users, and often leads to situations where all concerned are "going through the motions" because there is funding involved.

One important quality indicator for SMEs is recommendation, or provision, by supply chains. It is not uncommon for SMEs in supply chains to be required to ensure staff participate in training, both face to face and e-learning, as part of contract conditions. Once more the issue of quality is dealt with by recommendation, albeit with a degree of coercion.

If these quality measures, if they can be called that, seem informal and subjective that is because this is the way SMEs operate. As we have pointed out, it is notable that no mention has been made of the quality of the learning process – a measure we, like most researchers, would be most concerned with. This is not necessarily because SMEs and SME managers have no concern about this, and as we have said it would seem to be a largely intuitive factor that underlies their decisions, in that if they do not see substantial gains in terms of performance change (in other words, tangible evidence that useful and appropriate learning has taken place) they do not buy the training. The problem is that they have no way of judging such quality; or rather of expressing what is basically an intuition based judgement. This is especially so if e-learning programmes are not accredited and trainees have no external examination which, perhaps, has been the most widespread quality measure.

Reflective Commentary

The issue perhaps is how to develop quality models and tools which can assist in this process and which are clear and transparent in their utility for SMEs whilst at the same time developing policy measures which can facilitate (or enforce) the adoption of such quality standards. The alternative approach, and one we suspect would find favour with the e-learning industry group, is to leave the whole issue to the market. We do not believe such a solution is effective, especially given the fact that the market has paid little attention to the needs of SMEs over recent years, and is liable to focus only on the most lucrative areas, which is liable to leave many SMEs high and dry, since they often need learning in highly specialised areas due to the nature of their focus. Leaving things to the market is unlikely then to assist in the implementation of e-learning in SMEs although we accept there may be dangers of bureaucracy (and corruption) in any rigidly regulated system.

Thus, we believe the best approach is to develop more rigorous and widely applicable models for evaluating e-learning, rather than any national or European quality kite marks (quality marks) or the like. Of particular interest, given the fragmented nature and the wide range of contexts within the SME world would be to provide models that SMEs themselves can use to evaluate the potential of the solutions they are offered.

A further measure is to develop models for classifying quality approaches. Yet another approach may lie in further technical development.

These three approaches will be examined in the next section. This is not a definitive or comprehensive analysis of different initiatives on quality, but it does reflect the different approaches to developing models and tools

Models and tools for measuring quality in e-learning

The Leonardo da Vinci funded "Models and Instruments for the evaluation of e-learning and ICT supported learning (E-VAL)" project set out to identify the

different factors or variables involved in the evaluation of e-learning, to examine different theoretical approaches and models to evaluation and to assess their utility in the evaluation of e-learning and to develop and text different tools based on these models.

The project identified five major clusters of variables have emerged; individual learner variables, environmental variables, technology variables contextual variables and pedagogic variables. Each of these was disaggregated into more precise groups and further disaggregated until individual variables were identified and isolated.

The five main groups of variables were:

1. Individual learner variables including:
– physical characteristics (e.g. age, sex, physical abilities)
– learning history, (negative / positive experience, level of attainment, duration, recency etc.)
– learner attitude (positive / negative)
– learner motivation (high / low)
– familiarity with the technology

2. Learning environment variables including:
– the immediate (physical) learning environment
– the organisational or institutional environment
– the subject environment

3. Contextual variables including
– socio-economic factors (e.g. class, gender,)
– the political context (e.g. who is funding /paying for the e-learning and for what reason ?)
– cultural background (e.g. how highly is learning / e-learning valued ?)
– geographic location (e.g. country, language, urban/rural)

4. Technology variables including:
– hardware
– software,
– connectivity,
– the media
– mode of delivery,

5. Pedagogic variables including:
– Level and nature of learner support systems
– accessibility issues.
– Methodologies
– Flexibility
– Learner autonomy
– Selection and recruitment
– Assessment and examination
– Accreditation and certification

The project developed taxonomy of approaches or models for evaluation, which could be represented on a continuum (see figure 1 next page):

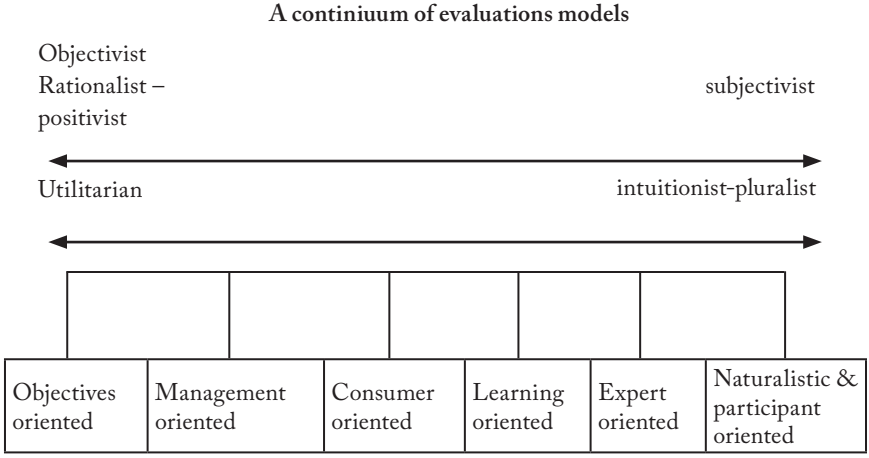

Figure 1: A continiuum of evaluations models

- Objectives oriented approaches
- Management oriented approaches
- Consumer oriented approaches
- Expertise oriented approaches
- Participant oriented approaches
- Learning oriented approach

Different models were examined for their applicability, advantages and disadvantages in the evaluation of e-learning. Two approaches may be of particular interest from the viewpoint of evaluating e-learning in SMEs.

The first is the management orientated evaluation approaches. The management-orientated approach to evaluation is meant to serve decision makers. Its rationale is that evaluation information is an essential part of good decision making and that the evaluator can be most effective by focussing the evaluation products on the needs of managers, policy-makers, administrators and practitioners. Developers of this approach have traditionally relied on a systems approach to evaluation in which decisions are made about inputs, processes and outputs based on logic models and cybernetic theory. However, more recent developments have highlighted different levels of decision and decision makers and have focussed on who will use the evaluation results, how they will use them and what aspect(s) of the system they are making decisions about.

Not surprisingly, the study found, it is the model preferred by many managers and management committees but the downside is that the needs of other stakeholders are ignored.

The second is the learning oriented approach. The operating principle is that the purpose of evaluation is to contribute to some form of collective or organisational

learning. Different models within this overall approach are based on different theories and types of learning including *corrective* or behavioural learning, cognitive learning and social learning. The outputs and processes of the evaluation form the inputs of the learning.

Learning-orientated evaluation approaches are still not widespread but are beginning to gather momentum in the social agency sector, in education establishments and in voluntary organisations.

The main limitations of this approach is that it does not lend itself to "mass surveys" as it relies heavily on personal interaction between the evaluator and the project team and the evaluator's understanding of the learning needs of the organisation. Also, within this overall approach there are very disparate models, some requiring a high level of commitment to the process, which may be lacking.

The project went on to develop text a number of tools, two of which were designed to evaluate e-learning in SMEs.

Both were based on the management approach One aimed to guide managers through the process of developing an e-learning programme whilst the other aimed to help managers of SMEs detect strengths and weaknesses of the e-learning program they are currently running, and thus provide them with information on organisational, pedagogic and technological implications of the training measure.

Both tools were successfully tested in SMEs and were found to be of assistance in helping managers in developing and evaluating e-learning.

The "Models and Instruments for the evaluation of e-learning and ICT supported learning (E-VAL)" project showed that it is possible to design and implement models and tools for evaluating e-learning in SMEs, although it is notable that both tools focused on formal e-learning provision. However, using the wider clusters of variables the project identified, it would be perfectly possible to develop tools which at least measured the potential of workplaces to support informal learning and what changes might be needed to facilitate and support such learning processes.

However, the issue remains as to how such tools can be moved from a project environment to mainstream practice in SMEs. This would probably require increased awareness of evaluation approaches amongst education and training, Human Resource Development and e-learning professionals. It would also require both awareness raising and commitment from SME advice and support agencies and business services. Such awareness and support seem some way distant at present.

The second interesting approach is that of the European Quality Observatory (EQO), established with funding from the European Commission e-Learning programme. Like the Eval project the EQO has also developed a multi faceted model for the evaluation of e-learning based on an eight step approach:

– Context and problem definition
– Identification of ones own vision of quality and consultation

- Identification of the position of the stakeholders within the context
- Focus on the area of the learning experience: learning sources, learning processes, learning context
- Criteria weighting
- Matching / checking available procedures and tools
- Development / adaptation / adoption
- Impact assessment

The strength of this approach lies in that it recognises: "in reality, the quality of the relationship between the learning action and the context in which it is realised is fundamental if you consider that one of the main aims of training and learning is to create the conditions to change, improve and innovate the competencies of the learners to interact with their social, cultural and working environment".

Within such an approach the EQO also recognises that there are many different tools and instruments that could be deployed.

They have developed a series of guides to steer users through the different steps and are working with the CEN / ISSS standards body to attempt to develop a metadata standard for the EQO model.

The idea of the standard is that this would then allow users to search either the EQO database or the World Wide Web to identify models and tools fitting their needs in terms of evaluation.

Its deployment in SMEs remains problematic for much the same reasons as does the Eval approach outlined above. Firstly the approach is mainly focused on formal learning, secondly it seems improbable that many SMEs will have the awareness and understanding to follow and complete the different fields in the metadata schema. Put simply, it is too heavyweight a tool.

However the approach has many merits in attempting to develop interoperability between different ICT based approaches to evaluating e-learning. Furthermore, it could be of considerable value to developers, HR professionals, teachers and trainers and business advisers working with SMEs on the implementation of e-learning programmes.

A third, if as yet largely conceptual approach is that of distributed metadata as advocated by some leading e-learning researchers such as Stephen Downes..

Frans Van Assche and Riina Vuorikari say that "to better understand the complex question of quality of web-based learning resources it is beneficial to look at the different processes during the life of a learning resource; what are the aspects of quality that are related to the creation of material, its discovery and eventually its use and re-use for learning purposes. They have identified a typical usage scenario for learning resources (Figure 2 next page). It covers all processes involved from creation to use. They say that "Whereas on an individual level not every listed process will happen, all processes are important from a systemic point of view and the system will be as good as its weakest link. As quality is related to purpose, this chapter highlights the different roles involved in the processes. For example quality characteristics of a learning resource will be different for an

author who must maintain a learning resource than to a learner who will value that it runs in her technical environment.

Improving the quality requires an understanding of and action on all the processes and roles involved.

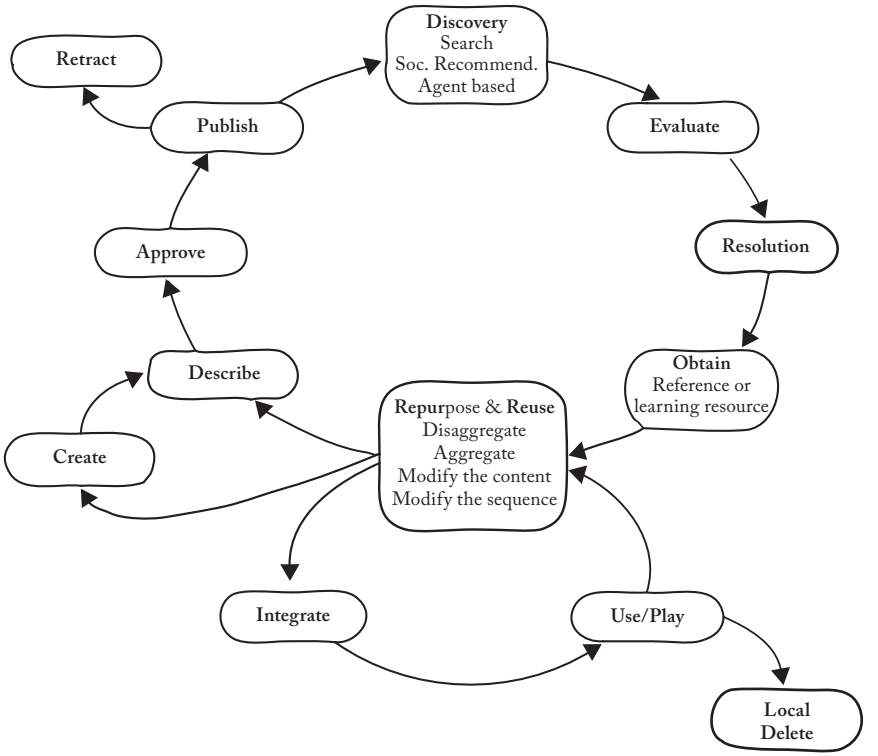

Figure 2: A typical usage scenario for learning resources

The issue remains of how such wide-ranging data could be gathered from different stakeholders, including the learners. One approach to this is distributed metadata using folksonomies or negotiated ontologies. The EQO CEN/ISSS approach relies on the development of a taxonomy and its acceptance within the community of practice. This begs the issue of who should be empowered to supply the different data required by the taxonomy. Folksonomies in contrast, relay on individuals creating their own descriptors. Data is then aggregated by service providers (e.g. del.icio.us, Furl, Flickr) and can be accessed through search engines. Then idea is that each person involved in the creation and use of e-learning materials would themselves be able to describe the materials including the context of their use. If a full track of the different descriptions were to be possible, a comprehensive and

potentially authoritative quality indicator would be developed based on practice and use. In theory quality learning materials would "rise to the top" of any search process and "gracefully degrade" as they became out of date and less relevant.

Research into this approach is in its infancy. It may be that totally free descriptors would be too random and there would be a need for some process of community negotiation towards an agreed and accepted ontology.

From an SME perspective this approach has much potential. The technology to implement the process could be lightweight. The system would reflect context of use, especially important in allowing some record of the different sectors in which e-learning materials were deployed. Furthermore, it should be possible to embed the tools needed for creating and maintaining a metadata trail closely within the process of searching for and using the materials. The approach of developing metadata based on learning materials - if learning materials are widely defined, they could more easily be applied to informal learning.

The purpose of this section has been to illustrate some of the different approaches to quality which are being developed and tested in practice. None can yet be considered mainstream. However all of the approaches we have outlined offer potential to developing the quality of e-learning in SMEs and to some extent begin to address the issue of informal learning.

Policies for Improving the Quality of E-Learning in SMEs

Some time was spent thinking about the heading for this section. The initial proposal was "Policies for guaranteeing the quality of e-learning in SMEs" but this is perhaps not helpful or even possible. Another possible title would be "Policies for promoting the adoption of quality e-learning in SMEs". Whatever the title, what is needed is an approach which attempts to improve quality, which first and foremost involves the provision of appropriate e-learning products, by building on formative evaluation. In this regard, I think there are a number of possible policies, all with advantages and disadvantages. One possible problem with any national approach to improving the quality of e-learning is that e-learning is often seen as not respecting national frontiers. Whilst there has been a period of takeovers and consolidation of the larger e-learning providers who now are truly multi-national companies, most e-learning provision remains national or even local in its focus; even the multi-nationals find themselves obliged to adapt their products to local contexts,. Furthermore, precisely because SME managers and decision makers tend to rely on recommendations and reputations local providers are at an advantage in this market. Therefore it is possible as well as necessary for national and regional governments to take measures to improve the quality of e-learning provision, at least for SMEs, within their countries and indeed most of the policies recommended here could be implemented at regional and even local level. Of course the European Commission is important in that it provides funding for research and development in e-learning and, through the European Social

Fund, is a direct provider of funding for e-learning in SMEs. Although EC policy for e-learning in SMEs is difficult to ascertain, there is little doubt that the EU has some influence in quality of provision through the evaluation and reporting requirements of e-learning programmes funded through the Social Fund.

A further issue is the extent to which governments should regulate or require compliance with quality measures. Almost all of the experts interviewed in the course of the ICT and SME project were in favour of government intervention but opposed to legislative regulation. I am not so certain. It is unlikely that the (largely private sector) e-learning industry will voluntarily agree to quality measures that may affect immediate profit. However, it is perhaps necessary to be pragmatic and view each possible measure on a separate basis.

Most of the measures described below are already being implemented to a greater or lesser extent in many of the European Member States. There is, however, considerable variation in both the "strength" of the intervention and the degree of regulation involved.

Policy Measures

Before outlining the range of policy measures that our research indicates would be useful in this context, it is necessary to mention a fundamental issue.

It is clear from our research that the key issue for adoption of e-learning in the SME context is relevance, both of methodologies and content. However though quality standards and some of the other mechanisms we mention below could address these issues indirectly, political issues and the perception of many public bodies of their role may make it unlikely that this kind of recommendation would be of great use. As will become clear in the comments below, in most cases, public bodies are unfortunately unwilling to engage in the messy process of evaluation of learning processes and methodologies, preferring to focus, so to speak, on the "box" rather than what takes place within it. For example, in many current traditional educational contexts inspectors tend to focus on "objective" criteria such as attendance, infrastructure and so on, rather than on what is going on within the classroom.. More attention needs to be paid to the quality of the learning process and the relevance of the content. The methodologies used to do this are a key part of the process.

However there is a range of policy measures that are applicable and these we outline here.

Inspection

Some European countries, for instance the UK, already have inspection services for education and training, at least for the public sector. One policy option, as is happening in the UK, is to extend inspections to include ICT based learning. Of course this presupposes consensus or agreement (or regulation) on criteria for inspection, the process of inspection and on how to deal with the outcomes. It also

assumes the availability of credible inspectors with the required knowledge and skills. Private sector e-learning providers might be hostile to the idea that they should be publicly inspected. However, for those providers in receipt of public support, it could be made a condition of funding. Although inspection may seem an old- fashioned quality measure it might still prove one of the most effective.

"Kitemarking" e-learning materials or introducing quality standards

We already have all kinds of kite marks or quality marks for a wide range of services and goods in Europe – including diverse areas such as consumer goods and agricultural tourism. (For those of you curious as to where the English language term Kite mark comes, it refers to the widely used consumer symbol of a kite to signify compliance with standards). For education and training there are standards in effect through the ISO – or in the UK the Investors in People award. However, these standards have been criticised for focusing on the existence of processes, procedures and documentation, rather than focusing on the quality of learning or teaching. In many cases the lack of attention to the teaching and learning process itself is a glaring omission that leads to the rejection of the concept of quality assurance systems by some of the key actors; the teachers themselves. Unfortunately the origin of these approaches, in manufacturing industry, is arguably an issue that makes them fundamentally inappropriate for use in education. Approaches that are designed to assess repeatable processes for creating identical products from identical raw materials are unlikely to be of great use in assessing unpredictable and as yet incompletely understood processes involving substantial and cumulative changes taking place in the minds of individuals who are massively non-identical at the start of the process, and furthermore aware of the process.

For e-learning systems and materials there are of course already many (some say too many) standards including LOM, SCORM and IMS-LD. But these, although important in terms of interoperability, are, at the end of the day, technical standards and once more tell us nothing about the quality of the learning environment or process.

Interestingly whilst the CE standard is a mandatory standard for producers of consumer goods, regardless of whether they are EU based or not, all the others referred to are voluntary.

There has been some discussion about introducing some sort of quality mark for e-learning materials but there is little agreement about just how this could be done.

Regulating Providers

Some countries already have approval systems for education and training providers, especially for those in receipt of public funding. Often, however, these regulations are more concerned with issues such as infrastructure and access than quality of teaching and learning. Nevertheless, regulation of those allowed to offer education and training utilising ICT is one possible option as a quality measure.

Training Trainers

This is possibly the most important step that could be taken to improve the quality of e-learning in SMEs. Even though we are finding that most informal learning is autodidactic, trainers still have an important role to play in supporting learning, often in a "mentor" role. Indeed, it is arguable that, at least for larger SMEs who do have some training infrastructure, there is a new role for trainers in supporting informal learning in the workplace. However many trainers have no expertise of facilitating ICT supported learning let alone informal learning using ICT, and it is often the case that peer mentoring is what takes place, colleagues or more senior staff find themselves in a "mentor" role. Research is needed into the kind of support these actors require.

Of course, initial teacher and trainer education should be reformed to include training in the use of ICT for learning. But, probably more important is the establishment and support of programmes of on-going professional development for teachers and trainers – or for those with some role or responsibilities in the teaching and learning process.

Promoting research and development

Whilst there is not a quantifiable link between investment in research and the quality of e-learning, it seems clear that further research is important. As mentioned in the introduction, our understanding of the effectiveness of e-learning is incomplete. There are very few studies of informal learning in SMEs and, as far as I know, none of the use of ICT for informal learning in SMEs, other than the work now emerging from the ICT and SME project. Support for further research in this area is critical.

Fostering networks

There has been considerable research into networking and SMEs with some researchers, surmising that developing and facilitating networks may be an effective way of increasing the take up and quality of e-learning in SMEs. This question is dealt with at some length in other publications from the ICT and SME project. Although the form and structure of networks differs greatly from region to region and sector to sector, the evidence suggest that this could be a fruitful area of policy intervention. The SEEL project have proposed the establishment of regional centres of excellence to support e-learning in enterprises.

Supporting infrastructure

Many national governments are already providing different forms of infrastructure support for the use of ICT in SMEs. Support is also frequently available under the European Social Fund. No measure of the effectiveness of such support appears to be available, neither is there any indication as to whether infrastructure support improves the quality of e-learning. But, if our findings on informal learning are correct, we could surmise that broadband availability is important in facilitating

informal ICT based learning. Obviously, the availability of broadband and other ICT infrastructure, does not guarantee that employers will utilise such facilities for their employees education..

Providing Information
Our research shows that there remains a huge information gap in terms of knowing what ICT based learning facilities and programmes are available and still more in knowing about how learning can be effectively implemented in SMEs. Once more, providing information may not improve the quality of ICT based learning in SMEs.

Promoting self-evaluation
The heterogeneity of the SME context makes it likely that however much the policies, mentioned above, are important for the sector as a whole, SMEs will always need to be able to evaluate the solutions they are offered in terms of their own often highly particular context. In this light it is vital to develop tools and training for SME managers that will give them the autonomy to be able to assess the potential quality of the training solutions they are offered for themselves. Furthermore, as we have mentioned, this perception of quality will be linked to the perceived relevance of what is on offer. Substantial work is required in this area.

Last Word

The last word goes to John Kruper who in a blog entry asks "how do you separate the hype from the reality when it comes to e-learning?" "After all," he says what e-learning provider doesn't say that their pedagogical approach isn't "highly interactive," "real-world-based," or „richly collaborative?" As a rubric to judge who walks the walk, versus talks the talk, he offers the following, which we have adapted slightly to take in the range of possible products and services:

So, if you are a customer looking for a supplier, I think you should apply this test. Ask the supplier to let you experience their product or service. If they are stand-alone products, sit in a room with a couple of their programmes or courses and then just work through them. If they are courses ask to join them as a guest for a while. The supplier is not allowed to help you or give you any background to the approach used or anything else. Just ask yourself:

1. Would I like to learn from this e-learning course?
2. Have I learnt (sic) anything? Does this feel like good learning?
3. How does this feel? Dull? Interesting? Simplistic? Professional?
4. Is it clear, easy to use, even fun?
5. Is this much different from PowerPoint or a text book on the screen?

Given the heterogeneity of SME contexts, however much a product or service may come with glowing recommendations, this approach to determining quality is probably likely to be as useful as any other we have discussed.

II. Infrastructure

Friedrich Scheuermann and Klaus Reich

One of the most striking findings of the ICT and SME study is the difficulty to adequately address SMEs because of their heterogeneity. They operate in almost every sector of the economy and vary widely in their size, organisational structures and finance and also in their learning and training needs. Additionally, they have to deal with limited personnel, limited organisational and financial resources and a lack of detailed training strategies that will enable their employees to be better qualified to cope with increased competition. This is a major challenge in the future development of e-learning for SMEs

The term e-learning itself is used for a variety of different approaches and technologies. The different methodical and instructional approaches towards e-learning need different infrastructures in order to unfold their full potential. Infrastructure can be seen from different points of view. Infrastructures for e-learning have sometimes been understood as only referring to the provision of software and hardware. With increasing access to computers and networks, this is seen as less of a barrier to the use of ICT for learning in SMEs than it was previously. However, there is still a problem in accessing affordable and effective learning platforms and programmes.

In our understanding infrastructure goes beyond computers and networks and includes all infrastructures necessary to support learners in SMEs. Therefore, such issues as learning materials and individual learner support, as well as organisational and financial matters are also addressed in this analysis.

The analysis in this chapter is based on empirical data gathered by the project partners in the ICT and SME project. The data includes a mix of different sources and research and applied analysis methodologies.

The chapter provides an outline of the most important findings in relation to infrastructure for ICT based learning from the empirical research.

Methodological Approach

The methodological approach follows 4 steps, outlined in figure 1 (next page):
a) Identification of e-learning methods

In order to identify strengths and weaknesses in the infrastructure of SMEs, it is necessary to define different methods of e-learning as they have very different infrastructure requirements.
b) Identification of necessary infrastructure

Following the identification of e-learning methods, an outline of basic infrastructure requirements has been undertaken based on a study of literature and an analysis of the system requirements of different e-learning systems and products.

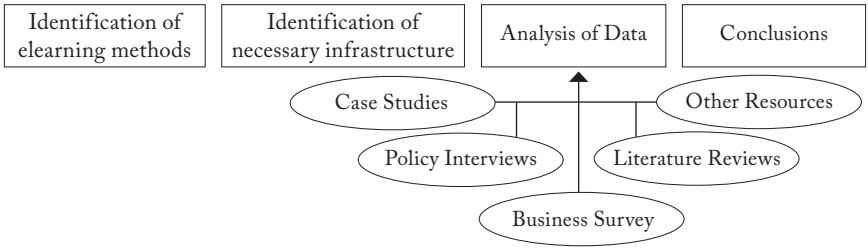

Figure 1: Methodological approach

c) Analysis of data

The infrastructure requirements have been mapped against the research results gathered in the ICT and SME project. Empirical research in the project included focus groups, literature research, case studies and a business survey in seven European countries.

Other external data has been taken into consideration where appropriate or necessary.

d) Conclusions

The conclusions are presented in different forms. In this study general conclusions are outlined taking into account the data of all the participating countries. Other issues are addressed in the analytical studies on people, quality and processes. Specific information and results can also be found in the individual country reports.

E-Learning

In order to grasp the necessary infrastructure for e-learning, it is necessary to identify:

- what is meant by the term e-learning;
- the different methods of e-learning;
- the infrastructure necessary for these different methods.

The term e-learning is used for a variety of methods of learning and teaching, which are supported and enabled by information and communication technologies (Revermann, 2004). The focus of the research community on ICT supported learning processes has been widened in recent years, taking into account more informal methods of ICT supported learning, including:

- the use of learning media that has not been explicitly designed for learning purposes, e.g. desktop computers at the workplace and work process software;
- the use of the internet and search engines for information retrieval and informal learning;
- self-organised exchange of data and information by the use of different communication tools and methods (Reglin, 2004).

Therefore, in this study a broad spectrum (see diagram below) of e-learning will

be taken into account, ranging from informal learning (for instance by searching for information at the workplace) to formal online training. This includes:

– e-learning near / at the workplace based on proprietary materials (Computer Based Training);
– e-learning near / at the workplace based in a classroom style of learning (exchange with others, e-moderators, e-coaches);
– learning processes taking place at working places (especially in knowledge intense enterprises) without learners learning explicitly, i.e. informal learning (Reglin, 2004).

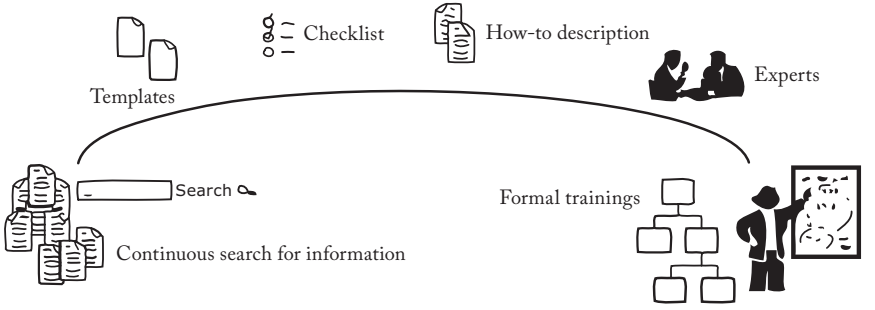

Figure 2: The spectrum of learning processes at the workplace (Ley, 2004).

The following section outlines the most important settings for e-learning and the demands on infrastructure (understood as hardware and software). Obviously it is not possible to provide a comprehensive picture of all methodical approaches and learning settings, described in theory and used in practice, but the list should provide at least an overview of the different requirements for infrastructure.

a) Computer-Based Training

CBT are learning systems that support the learner by offering learning content that, in most cases, include multimedia elements and interactions in the form of questions and predefined feedback (Seufert & Mayr, 2002). CBT is offered as courses or general learning content that can be used locally on a PC or Laptop. It can be stored locally (CD-ROM, DVD), and can be used without a connection to other computers or servers. This makes updating difficult or impossible. A PC/Laptop with multimedia support is required for its use. The demand of CBT on hardware is increasing as more multimedia content (with ever higher resolution and quality) is used in the learning application.

b) Web-Based Training

In contrast to CBT, web based training (WBT) is not stored locally but can be downloaded or accessed from a remote server. Web based training has the same advantages as CBT, but can be updated more easily and may be accessed by learners through the Internet. WBT uses the infrastructure of an intranet or the internet:

the principal tool is the web browser, used for accessing learning materials and communication tools. Additional to the demands on infrastructure for CBT, a network connection is needed.

c) Tele-Learning

Tele-Learning (or distance learning) describes the learning setting of dispersed teachers/ trainers and learners. Because of this spatial, and most often time bound, separation, communication tools are essential elements. Amongst others, e-mail, chat or audio-/video conferences are used for communication.

d) Blended-Learning

Blended-Learning is a mix of face-to-face training and online learning that should successfully combine positive elements of both training and learning settings (Seufert and Mayr, 2002). Blended learning has been introduced following the experience that online training alone is often less successful than combined approaches to learning. Besides the need for online communication, a learning management system infrastructure for face-to-face training is also required.

e) On-Demand-Learning

Learning at the workplace can be undertaken in the form of formal ICT supported training. However, another important aspect is learning while working (alongside working processes). In that case, the demands of the work determine actual learning needs and employees should learn continuously while fulfilling their working tasks. Ad-hoc-, Just-in-Time-, On-Demand- and Realtime-Learning are terms used to describe learning in such contexts. Therefore, learning processes should be relatively short and targeted (Back, 2003). E-training and e-collaboration are two basic learning methods fulfilling these requirements.

f) E-Training

The transfer of different forms of content is a central aspect of e-training and therefore, most often short WBTs are used as small tutorials on different topics. The term "content" itself has to be seen from a very broad perspective. Elliot Masie coined the term "Google-style learning" for this learning approach (Back 2003) meaning that learners do not want or need structured CBTs and WBTs or Learning Management Systems (LMS) but get their "learning materials" through a quick search in Google or other search engines. It is also possible that applications running on the PCs and laptops of learners can make suggestions of possible learning materials. Similar functionality is already in use by the "paper-clip assistants" used in MS Windows.

E-Collaboration

In the daily working routine it is common practice to question employees, team members or experts. Telephone calls and e-mails are used often but instant messaging or video conferencing may be used successfully in the enterprise for such purposes. 'Teamroom' applications and expert platforms provide information on the online status of contacts and spontaneous e-meetings may be held through conferencing tools.

Online-Communities

Informal learning is strongly characterized by the search for information, which is based on interests or work tasks. At the same time the need for formal qualification is significantly reduced. Surfing the internet, driven by learning needs, can be seen as an ideal form of informal e-learning.

The communications of experts on work related issues through online communities offers the opportunity to mediate knowledge, experience and tips on working issues, communicate with persons interested in this information and elaborate on different issues. In such an exchange amongst experts the difference between trainer/teacher and learner is reduced. Learners are able to obtain immediate solutions for problems in their working tasks. A complex problem may be visualised locally with documentation or authoring tools and may be discussed by the community. This type of informal learning is enriched by aspects of seminar type group learning and communication (Hahne, 2004).

Identifying Infrastructure Needed for ICT Based Learning

Infrastructure in General

In the following section, the basic requirements for ICT based learning, taking into account the different pedagogical settings outlined above, are analysed. Whilst functional hardware and software, appropriate external devices and bug-free learning software are needed for successful learning, they have to be accompanied by a learning environment that supports effective learning (support from managers and a positive attitude towards learning are probably the most important driving factors for successful ICT supported learning). Furthermore, the knowledge and competence of the learners are key elements for successful workplace learning. If all these demands are met in the enterprise, information and communication technologies can be very useful instruments – beside others – to support learning in SMEs (Reglin, 2004).

In the separation (in many enterprises artificial) between formal and informal learning settings, we do not want to favour one or the other approach for ICT based learning, but aim at providing an overview of the broad spectrum of ICT based learning and the differences in infrastructure needed.

Infrastructure needed for formal ICT based learning processes

As has already been pointed out above, the requirements for infrastructure vary widely depending on the learning setting and are also influenced by the sector specific needs of the SMEs. The main starting points for us are the needs of individual learners.

The regional learning infrastructure also has an influence on ICT based learning in SMEs. Besides the need for different learning and training providers, consultancy services and common infrastructure (internet connections, etc.), transparency of access to services has an important impact on the effectiveness of ICT based learning (Trier et al., 2003).

There are sometimes specific requirements for learning at the work place. This might result in the use of mobile devices and specific learning settings (e.g. PCs for learning purposes in the production process – 'learning islands').

Internet connection

The are still Many CBT applications still do not require access to the internet. A broadband internet connection is increasingly required for online learning. Advanced learning management systems have built in functionality for audio and video-conferencing requiring a fast internet connection. Furthermore, multimedia based learning content requires considerable bandwidth.

Learning materials

In most cases the question whether to develop or purchase learning materials is not relevant for SMEs. The production of professional learning materials for formal training is expensive, time consuming and requires ICT expertise. On the other hand, SMEs may have difficulty in selecting learning materials in a market that is still far from transparent. The situation is even more difficult for SMEs as e-learning vendors try to develop products for as many customers as possible (economies of scale). Whereas producers try to sell as many products as possible, SMEs are often looking for customised training solutions (Reglin, 2004). There is a demand for modularised courses and training programmes that may be accessed from the work place as well as individually configurable learning resources that allow efficient and cheap learning (Fromm, 2003)

Learning culture – social and organisational requirements

In order transfer the flexibility through the use of e-learning into the daily working (and learning) routine, the following issues have to be considered from an organisational / management point of view:

- Managers have to support e-learning / learning at the workplace;
- There is the need to provide space and time in the work routine;
- There has to be agreement on learning times;
- A positive attitude towards learning is required;
- Individual learning processes need to be situated in the enterprise
- Provision of space and equipment for learning is needed.

Learners

Although the analytical study on "People" in the framework of the ICT-Vet project is targeting the needs and requirements of learners, it is necessary to outline in short the importance of considering this aspect in relation to infrastructure in SMEs. The possibilities for implementing successful e-learning is very limited if:

- learners lack basic knowledge about operating systems;
- learners are not familiar with basic internet technologies;
- learners. have mental barriers towards e-learning;

– learning materials are not in accordance with the skills of the learners;
– learning materials do not meet the needs and interests of the learners.
– the need for social exchange is not adequately addressed.

State-of-the-art infrastructure for ICT based learning is of no use if learners are not able to utilise its potential. Learners in SMEs may need more ICT skills as many enterprises do not have ICT specialists.

Additional infrastructure

Additional infrastructure in terms of hardware and software, Learning Management Systems, tutors and trainers, internet connections, web servers, programmers, multimedia developers, system administrators, bandwidth, consultants, financial support etc. may be needed in specific learning settings or if e-learning is offered to a large number of employees in a company. Reglin concludes that the demand for infrastructure in formal e-learning settings easily surpasses the needs for supporting "traditional" formal training (Reglin, 2004).

Infrastructure for informal ICT based learning processes

The term informal learning and the meanings ascribed to it have a long history. Straka (2003) has worked out, in depth, the different positions concerning formal, non-formal and informal learning and their evolution through the past decades. There is no need to go too deeply into this discussion. What we seek is a working terminology that allows us to identify the infrastructure needs. The definition proposed by Bjornavold & Colardyn provides a good starting point:

> *"Informal learning is defined as learning resulting from daily life activities related to work, family or leisure. It is often referred to as experiential learning and can to a certain degree be understood as accidental learning. It is not structured in terms of learning objectives, learning time and/or learning support. Typically it does not lead to certification. Informal learning may be intentional but in most cases, it is non-intentional (or 'incidental'/random)." (Bjornavold & Colardyn, 2004).*

Cross (2006) further differentiates between two modes of informal learning:

– "Rapid informal learning": to keep the knowledge of 'High Performers' up to date (by questions, search, observation, trial-and-error, etc.);
– "Deep Informal Learning": to target wisdom and experience (by reflection, mentoring, story telling, networking, feedback, etc.).

In order to stimulate informal learning, Cross proposes eight necessary tools. At the core, these tools embrace the use of different media (visualization), communication and social exchange with others (conversation, virtual connections, net connections), a positive learning environment (unconferences) and a focus on learning without formal certification. As a technical means for learning, he focuses on the use of the web browser, which enables employees to navigate through knowledge management systems, search for information on the internet or share expertise with others in online communities (Cross, 2006).

Obviously these demands for infrastructure in terms of hardware and software may be faced by almost every SME. It is more difficult to address the necessary context for learning. Learners need competencies in self-directed learning, know-how on search strategies in the internet and to be open minded for further development. This has to be supported by the organisation in technical as well as organisational terms, and the openness within the SME for communication and information processes within the enterprise and with other enterprises, chambers, research institutions is important. (Reglin, 2003).

Analysis of Empirical Data

This chapter provides an outline of the most important findings from the empirical research undertaken in the ICT and SME project.

Based on the results of the business survey, SMEs in general have a relatively positive attitude towards ICT, especially in Austria and Sweden. There is a gap between the recognition of the necessity of using computers for work and accepting use of the internet by employees as part of the working processes. The findings of the project concerning hardware and software are in line with the European e-business report (2003), which concludes that in most Western European countries hardware equipment is adequate (EBW 2003), whereas in some other countries, mainly in Eastern and Southern Europe, SMEs still lack basic hardware and software.

Besides country specific issues, there are a number issues that deserve more detailed future research. In particular there are a number of findings related to the size of enterprises.

- In the Netherlands, the larger the company the more software is used;
- the smaller the Spanish companies are, the less frequently employees use email;
- companies with more than one work location use relatively more presentation software (in Austria, Italy and the Netherlands);
- in the Netherlands, companies with 4 or more work locations use newsgroups and discussion boards relatively frequently;

However there are a number of contradictory findings. Medium-sized companies in Sweden have a less positive attitude towards ICT than micro and small enterprises.

Other findings include:

- Age matters: younger enterprises (in terms of when they have been founded) tend to be more open towards the use of ICT;
- Many companies use the internet for contacting suppliers and some organisations have access to customers and supplier information systems;
- Sectors matter: SMEs in different sectors have different a speed of ICT adoption.
- The infrastructure of SMEs may depend on the openness of the management towards ICT.

Most enterprises surveyed use e-mail and management applications and most of the companies observed have develop their own websites to provide information about products and services. Many used software specific to their sector.

Problems reported in the case studies included the following:

– Some enterprises complained that technologies did not match the needs for ICT based learning;
– There is hardly any reference to the use of mobile devices for learning purposes;
– Video-conferencing is seldom used;

Network connections

In many enterprises access to the internet is restricted. Overall, internet connectivity has improved considerably and is likely to improve still further in the forthcoming period. However, a significant percentage of SMEs still lack broadband connections, particularly in rural areas.

	Internet access	**… of those**				
		Analogue modem	**ISDN**	**DSL**	**Other Broadband**	**> 2Mbit/s bandwidth**
Micro (0-9 empl.)	91%	19%	25%	45%	10%	9%
Small (19-49 empl.)	96%	15 %	29%	46%	13%	8%
Medium (50-249 empl.)	99%	6%	17%	53%	25%	21%
Base (100%)	All	Firms with internet access.				

Source: EBW 2005 p. 19: on the basis of 5.218 telephone interviews covering 10 sectors in 7 countries; "All" refers to enterprises using a computer.

There are considerable differences between countries and in some countries cost is still a major barrier.

Learning materials

Surprisingly, the issue of appropriate learning materials was rarely mentioned by the enterprises. The reason for this may be that SMEs focus more on informal learning, but more likely is the lack of formal e-learning in the SMEs studied. Learning materials more often referred to in the policy interviews and focus groups. A number of issues arose. Standardised products often do not meet the needs of SMEs and customised learning materials are either unavailable. With relation to

language, localised learning materials are often expensive and there appears to be a lack of trial software in other languages than English. Most product information is only provided only in English.

Organisational context and management

In the business survey a significant relationship between the organisational characteristics of the SMEs and the frequency of use of ICT for communication, learning and training and work can be found in four countries.

In the case studies the following issues were reported. Very different responses were given on the availability of hardware and software for employees - ranging from all employees having access to computers and internet to the other extreme that only managers have access to the internet. Here sector differences might have an influence, e.g. in the IT sector the majority of employees seem to have unlimited access to the internet. Additional issues addressed in the case studies included the unsuitability of equipment for ICT based learning and the lack of working places adapted to support ICT based learning.

Other results from the case studies included the limited time dedicated to training and the lack of explicit training plans, therefore indicating major weaknesses in the organisation of learning in general in some SMEs. In one case, a manager would not hire employees unwilling to manage their own learning needs.

Financial issues

Infrastructure in terms of financial support for ICT based learning is a somewhat ambiguous factor, which is difficult to address in the data. Of course, enterprises in the case studies and interviewees from sector organisations claim that more funding is needed, e.g. for broadband initiatives. However, that does not indicate whether there is a real need for additional finance for learning.

A more serious problem is the small training budget reported in some case studies and the limited money dedicated to ICT infrastructure for learning purposes. The high cost of tailored training programs is also seen as an obstacle.

In order to improve the situation, several proposals have been made in the case studies, focus groups and policy interviews:

- The haring of costs among networks of SMEs;
- Public funding for personalised training materials;
- More support for broadband;
- The promotion of open source products;
- Public subsidies (vouchers) for using internet cafes for learning;
- Rental systems for ICT for learning purposes.

Public and private support

In the section on financial issues it became clear that some SMEs require public and private support. The proposals made in the interviews and case studies for what forms support should take differ considerably:

The Italian case studies suggest that a major technological push should be initiated supported by public funding for personalised training. This should respond to the specific needs of SMEs.

Counselling, information services and support for learning in networks and sector organisations has been proposed in several cases. This does not match the results from the business survey indicating that the SMEs do not have a strong relationship to sector organisations or other associations (especially in Wales and Spain).

The proposal regional educational learning centres (from the literature reviews) do not match the policy interviews from Austria where regional learning centres were established but were little used.

Additional support requested by sector organisations included the stimulation of infrastructure by funding, the development of learning contents and the facilitation of e-learning in general.

Attention was also drawn to the limited market transparency and the lack of literature and information on ICT based learning.

Other issues

Besides a multitude of individual wishes, proposals, recommendations and complaints the following issues emerged as issues addressed in several case studies or interviews:

- Networking in formal networks is seen as too time-consuming, and lack of trust is another problem that hinders mutual exchange and support for ICT based learning.
- Informal networks are seen as very valuable and they provide faster possibilities to gain information.
- Local networking is not always possible or even desirable (i.e. external opinions and inputs enrich learning approaches).
- Different regulations across sectors are major difficulties in initiatives targeted to support SMEs in general.
- A need for awareness campaigns and consultancy has been proposed especially in the policy interviews.

Conclusions

Summarising the results of the different data sources, it becomes obvious that employees of SMEs are rarely offered the opportunity of structured corporate training or further education. The main reason is that the majority of SME do not have internal training systems or departments. Moreover, their human resources development policies cannot be compared to a large-scale enterprise. Additionally, further education is rarely regarded as part of the added value of enterprises (MMB 2004)

Michel (2004) concludes that SMEs often cannot handle internal training adequately. He states that certain SMEs do possess the competence to offer their employees training supported by e-learning technologies. Successful implementa-

tion of these technologies, however, depends on their cost-effectiveness as well as their user-friendliness. The latter is especially relevant to employees of SMEs, since they often have restricted knowledge of computers and require assistance by tutors (MMB 2004).

The European e-business survey (EBW 2003 and EBW 2005) stated that computers and internet connections are widespread within the EU and that the basic level of provision of computers and internet has reached its upper limit, at least in west Europe. The authors consequently conclude that those enterprises without internet connections at the time of the survey will continue to stay offline in the future. Those enterprises are mainly micro-enterprises with less than five employees, which could not generate added value through the use of online technologies.

The widespread corporate use of computers and the internet within the EU constitutes a central basis for the application of ICT based learning. These figures, however, provide only limited information on the quality of the infrastructure. Many enterprises cannot keep up with the fast pace of development of software and hardware. SMEs show a trend towards broadband connections. This in turn could be seen as the basis for future implementation of e-learning applications or more possibilities for informal ICT based learning processes.

Because of the widespread use of computers, e-mail and the internet have become everyday applications; intranets/extranets are also on the rise. Most enterprises, have implemented Local Area Networks (LAN) as well as Wide Area Networks (WAN). Enterprises with a small number of employees are again behind in this respect (EBW 2005).

Further findings of the European surveys showed that most enterprises profit from the implementation of ICT and are thus able to organize their internal work flow more efficiently. This process does not necessarily require expensive and special software, but can be supported by simple applications. These applications are cost-effective and can be easily implemented, which also enables SME to use them for learning processes. However, it is again mostly large-scale enterprises, which make use of these applications, because the larger the enterprise the larger the benefit from IT supported workflows.

The findings of the survey suggest that e-learning plays a rather minor role; however, the share of enterprises using e-learning increases with their size. Only 6% of small enterprises and 12% of medium-sized enterprises apply e-learning (2003). The findings confirm that other business processes have higher priority, also within large-scale enterprises. No real indication can be given to what extent ICT is used for informal learning processes.

ICT based learning in general adds to flexibility, especially in the field of corporate learning. Yet, great efforts will be needed in order to make ICT based learning more attractive to a wider user group. SME, in particular, need to create corresponding frameworks for the implementation of ICT supported learning. Otherwise, they will not be able to participate in the advantages of e-learning.

Increase in mobility
Labour mobility and consequently the distance between the workplace and home continue to rise. Job specialisation, the desire for self-fulfilment, and the frequent change of jobs lead to a rising number of commuters. Mobile learning could be an attractive option for commuters, since many of them already have notebooks, PDAs or mobile phones. Particularly in the field of mobile learning, however, there is a lack of learning arrangements and contents. The development of e-learning applications for corporate training, which can be used on mobile devices like notebooks and PDAs, seems to be desirable (Michel 2004).

Increasing home use of the internet
Employees not only use the internet at their workplace, but increasingly at home. E-learning is mainly focused towards the workplace rather than at home. In order to make further education with e-learning more attractive in a private context, Michel (2004) suggest to new arrangements for further education and training in private surroundings. Thus, e-learning could play a more prominent role also off the job. The prerequisite for such arrangements, however, is the development of self-learning competences.

Broadband use in SMEs
Broadband connections can be regarded as a prerequisite for many e-learning applications. Additional initiatives to make broadband connections more attractive are needed. An example for such an initiative is the cooperation of the Austrian bank 'Bank Austria Creditanstalt' (BA CA) and the broadband provider 'Inode'. This cooperation offers business enterprises and freelancers a rebate of up to 27% on internet connections (Der Standard, 2004).

SME networks and portals
Because many small enterprises cannot or do not want to afford an expensive e-learning infrastructure, a number of networks and portals have been developed in order to share the costs of e-learning. Besides the opportunity to use shared technologies and e-learning programmes, these networks offer enterprises a number of further services, inlcuding support and counselling for the implementation of e-learning.

Organisational change
The implementation of e-learning and a learning culture that supports ICT-based informal learning often requires a reorganisation of enterprise based training programmes as a whole. In order to guarantee the successful integration of e-learning in enterprise surroundings, the management, trainers as well as the human resources development department need to be convinced of the advantages e-learning offers. Furthermore, employees need to be involved in the implementation process, and self-directed learning at the workplace as well as in one's spare time has to be practiced (Bellinger & Krieger 2004).

In many cases, experienced in the course of the project, technology or the costs related to technology redo not constitute the central problem. It is rather learners, sector specific requirements, organisational structures and the learning culture that can be seen as barriers to a successful implementation of e-learning. These factors can be regarded as a further infrastructural area that needs to be looked at more closely in future research; in order to improve the general framework for ICT based learning in SMEs. The successful establishment of computer and web-based learning requires a change, regarding the significance of c learning in general, and the personal as well as organisational learning culture. E-learning cannot be seen as a ready-to-use technology, but as a learning concept that requires a general organisational framework as well as establishment within enterprises (Fromm, 2003). Many enterprises, however, still do not meet these requirements.

12. Learning Processes with ICT in SMEs

Cecila Katzeff and Elmo De Angelis

This chapter reports findings from the analytical study of processes involved when small and medium sized enterprises (SMEs) learn with ICT. The aim of the study was to analyse the area of processes regarding "issues, opportunities barriers and solutions for the use of ICT based learning for vocational training in SMEs as a basis for the development of reference materials and policy frameworks and strategies".

To specify these processes is a complicated task, since our studies so far indicate that in some of the countries under review it is far from obvious that SMEs learn at all with ICT. This makes the subtask of this analytical study seem a bit off the track. If – in some countries and in some sectors - SMEs generally do not learn with ICT and especially not from ICT-based courses (e-learning), it makes little sense to analyse pedagogies for e-learning and the provision of platforms. However, it would make sense to analyse the empirical studies in relation to what learning processes occur (or do not occur) within SMEs. It would also make sense to analyse processes made visible by the studies in respect of SMEs actual use of ICT and their conceptions of it.

What is Meant by Processes?

Learning processes describe the situation of how SMEs learn in relation to organisational learning ideas and learning theories. In learning processes we also need to take into account the specific opportunities and constraints SMEs face. Educational processes, on the other hand refer to an activity intended to affect learning processes. Educational processes are formal and organised and include recommendations on how to design for learning.

What Does Learning Mean?

Learning is a common concept in most people's vocabulary. But learning is also a scientific concept, dealt with by researchers from various disciplines, such as education, psychology, computer science and economics. Since learning is a central concept in our project, it is one of the endeavours of this analytical study to provide a basis for interpretation of the part of our results dealing with learning.

There seems to be a consensus in modern theories of learning concerning major standpoints. First, in contrast to the behaviorist view, the learner is no longer regarded as a passive receiver of knowledge, but as an active constructor of meaning. This view of the learning human being is especially emphasised within constructivist (Piaget, 1977) theory. People's interaction with artifacts may be viewed

as a process where understanding is created and what is learnt is situated within a context. Secondly, learning is viewed as a social process. Just as the physical world is shared by all of us, we also share an understanding of it (Vygotsky, 1978). Learning is, thus, regarded as an internal and social deliberation. Thirdly, learning is a process going on not only in the individual learners, but also in the culture of the learners (e.g. Lave and Wenger, 1999). According to ideas of situated learning (Brown et al., 1989) and distributed cognition (Hutchins, 1995), knowledge not only exists within individuals, but also in the discourse among individuals, social relations connecting them, the physical artifacts they use and produce as well as theories, models, and methods they use to produce them.

Some researchers and practitioners believe that it is important to distinguish between formal and informal learning. They hold that formal learning is learning taking place within an educational institution or training context. Formal learning is planned and goal oriented. Informal learning, on the other hand, refers to the kind of learning taking place in everyday or working life. Informal learning may occur intentionally and may be planned. It may also be organised as a form of self controlled learning or through different forms of experience based learning. Participation in networks, coaching, consultation and mentorship are examples of intentional informal learning. Although some informal learning is intentional, most of it is spontaneous and unintentional. It usually occurs as a side effect of other activities. Such unintentional learning is an aspect of most human activity and we usually do not reflect on it. Of course, this type of implicit learning may be made conscious, by being indicated to us and reflected on afterwards.

In contrast, some researchers hold that the distinction between formal and informal learning does little for the understanding of workplace learning. Billett (2002), for instance, criticise this distinction because it describes informal learning in a negative, imprecise and ill-focused way. Billett argues that it is imprecise and misleading to describe individuals' engagement in work activities as being unplanned or unstructured, as they are highly structured and intentional. Moreover, there are pedagogical qualities to participation in work. Indeed, rather than being incidental, these experiences are often central to the continuity of work practices.

What does learning with ICT mean?

A second endeavour in this analytical study is to apply the description of formal and informal learning processes to the way the SMEs in our empirical studies use ICT to support the different types of learning processes. Issues relating to the outcome of the study include to what extent data obtained by partners reflect formal and informal learning processes. For the purpose of this paper we refer to formal learning in accordance with the meaning specified above, that is learning taking place with an educational institution or training context and being planned and goal-oriented. Such learning processes are, for instance, formal e-learning courses and formal face-to-face classroom learning. Also, in accordance with the meaning specified above, we refer to informal learning as the kind of learning

taking place in the workplace. It may occur intentionally and may be planned, for instance participation in networks, mentorship, apprenticeship and coaching. However, most informal learning is spontaneous, unintentional and usually not reflected upon. Learning takes place as a side effect of communication with other people and is both mediated and non-mediated by ICT. An obvious ICT mediated example is learning through email communication with colleagues within or outside their organisation.

Method

To identify and analyse major processes involved in SMEs learning with ICT, a semi-structured method of analysis was undertaken. The formulation of the method in the project work programme states:

The analytical studies will be based on four central reference sources: The literature reviews, the survey data, the initial round of case studies, and discussion between project partners and between project partners and SMEs, through project workshops face to face interviews and through on-line discourse.

There is, thus, no stipulation of a scientific method to analyse the results. In one sense, this leaves a freedom for each partner to apply a method of analysis of his or her choice. However, the dependency of interpretation of results from surveys and case studies generated by each partner restricts the method of analysis of the present study. Interpretations of results do not follow a controlled schema and thus may differ between countries. Since the analysis of processes is based on these interpretations, the method of analysis must be considered as informal and its results as issues to be discussed rather than scientific findings. For instance, whereas most countries frequently categorize their data as informal learning, this concept is not used consistently between the partners. Thus, its scientific quality may be brought into question.

The semi-structured method of analysis applied in the present study consists of three steps:

1. Each country's interpretation of results from their own data involving processes
2. Identification of types of processes represented in a grid with interpretations from each country
3. Analysis of opportunities and barriers regarding types of processes identified in 2.

Results - Emerging Issues

An examination of the literature review on learning in SMEs reveals a great amount of sources on learning in organisations in general. However, very little research has actually focused on learning in smaller enterprises. In a thorough literature review, Florén and Tell (2003), conclude that research on SMEs and

learning is in an early stage of growth. Research in the area is still built on primary empirical research and there are no obvious core groups of researchers publishing in the field that are frequently cited. Actually, most articles have not been cited at all. Another conclusion drawn from the Florén and Tell review is that research in the area of SMEs and learning is multidisciplinary. According to Ratnatunga and Romano (1997, p.198 and cited in Florén and Tell, 2003), the general diversity of topic areas may

> *"…provide some empirical support for the garbage can model synthesized from earlier studies of emerging fields in which diversity in topic areas has been characterized as a loose collection of ideas rather than a coherent structure with a shared intellectual paradigm"*

Although Florén and Tell (2003) may identify a trend pointing to an increasing interest in applying a focus on learning in research on small businesses, they recognise that learning is still treated as a variable within the study of, for example, marketing and strategic planning in small firms. Empirical studies of learning per se in small businesses are rare.

Learning organisations and organisational learning

The concept of learning organisations has been defined by Senge (1990) as:

> *"…organizations where people continually expand their capacity to create the results they truly desire, where new and expansive patterns of thinking are nurtured, where collective aspiration is set free, and where people are continually learning to see the whole together."*

Rather than being a realistic description of organisations that exist, this is criticised for being a description of an ideal organisation – something for real organisations to strive for, but with little theoretical substance. A second criticism is that the focus on creating a template and on the need to present it in a form that is commercially attractive to consultants has led to a significant under-powering of the theoretical framework for the learning organization. Here, there is a distinct contrast with the study of organisational learning. Whereas the literature on organisational learning has focused on the analysis of processes involved in individual and collective learning of organisations, the learning organisation literature has an action orientation and is directed towards using specific evaluative methodological tools to identify the quality of learning processes inside organisations (Easterby-Smith and Araujo, 1999).

Business surveys

Interpretations of results from the survey as entered by the partners in a grid suggests that in Spain ICT is used very little for the training of employees in the company, whereas in Poland there is an intense use of e-learning and IT tools especially for safety issues at the workplace. In Italy a small percentage of SMEs have all their staff following training courses organized directly by the enterprise. In Wales there are no examples of formal learning using ICT, although there are

plenty of examples of informal learning using ICT through sharing information. In Sweden, only 6% of the respondents used online courses.

The survey question on the frequency of use of ICT for learning and/or training on a scale ranging from 1 to 5 (1=not at all, and 5=very frequently) had a mean response of 2,3. This figure probably reflects a use of ICT for formal as well as informal learning, since the question does not differentiate between the two. Enterprises are generally encouraging their employees to stay up to date by following courses (mean=3.2/5). Only in the UK was the score less than 2.5 on this item. The mean score on training budgets was 2.4, which is considered quite low. Austria reported the highest frequency on having a considerable training budget (3.3/5) and UK the lowest (1.6/5).

In general, ICT is not much used for communication within the company but more for communication with partners outside the company. ICT is not much used for learning and training. In general, the attitudes towards a culture encouraging problem solving in the companies are moderate. In Austria, the Netherlands and Spain, these attitudes are more positive than in the other countries. SMEs in all countries show positive attitudes towards sharing information and collective problem solving within the company. Sharing information with colleagues in the same profession, but outside the own company, is valued less.

Case studies

Non ICT-based Learning strategies identified by partners in case studies

Strategies identified by the Austrian partner:

Size of enterprise	**Learning strategy**
Micro (no 12)	Employees' responsibility – training material available at office
Small (no 2)	Self-directed, employee's responsibility
Small (no 6)	In-house training
Medium (no5)	Employees' responsibility
Medium (no 9)	Training courses/seminars for volunteers

In general all enterprises tend to have some training policy but this policy is more or less worked out (written down). In some enterprises there are worked out training plans and time sharing models for training – in others informal agreements; all entrepreneurs are concerned about training. In most enterprises, employees have to learn in their free time and very often they also have to pay for training, especially in micro-SMEs.

Strategies identified by Spanish partner:

Size of enterprise	Learning strategy
Micro (no 1, 2)	Courses in working hours
Micro (no 4)	Depends on needs of employees (Employees' responsibility)
Small (no 5)	Courses outside working hours
Small (no 6)	Depends on needs of employees (Employees' responsibility)
Small (no 7)	Formal courses focus on certification
Small (no 12)	Voluntary courses encouraged throughout the year
Small (no 13)	Formal courses by suppliers
Medium (no 8)	Depends on needs of employees (Employees' responsibility)
Medium (no 9, 10, 14)	Some formal courses (free - government provided)
Medium (no 11)	Wide range of formal courses provided
Medium (no 3)	Courses outside working hours, but compensated

Strategies identified by Welsh partner:

Size of enterprise	Learning strategy
Micro (no 1)	Informal job shadow and skill share
Micro (no 2)	Depends on needs of employees (Employees' responsibility)
Micro (no 9)	Intense continuous self directed learning
Micro (no 10)	Informal networks for skill share
Micro (no 11)	Peer network for skill share
Small (no 5)	Informal job shadow and skill share, self directed learning
Small (no 7)	Formal courses and job shadow
Small (no 8)	Some formal courses
Medium (no 3)	Informal job shadow and skill share

None of the Welsh micro cases reported any formal learning strategies, such as participation in courses organised either internally or externally or participation in conferences. The learning strategies of the Welsh cases may be characterised by informality, which might also have an element of individual responsibility. One small enterprise reported some formal courses, but the rest of the cases (small as well as medium enterprises) do not seem to differ from the micro sized enterprises regarding learning strategies.

Strategies identified by Swedish partner:

Size of enterprise	Learning strategy
1 Micro	Formal on site courses
2 Micro	Conferences, seminars
3 Micro	Classroom courses to update knowledge on tools
5 Micro	No learning strategies
7 Micro	Regular meetings to share knowledge between individuals
4 Small	Problem based
6 Medium	Apprenticeship based and regular meetings to share knowledge between individuals

It is difficult to draw any general conclusions from this data. No particular learning strategy seems to appeal especially to micro sized enterprises. Contrary to common sense, though, it is interesting to note that micro size enterprises actually do organise and/or participate in formal training. This training is represented both as formal courses and as participation in external conferences and seminars.

Strategies identified by Italian partner:
No analysis of individual strategies was provided. However, the Italian partner provided a summary of learning strategies.

Formal learning processes
Formal training is organised in Employment and Training Centres or suppliers training centres, external to the company. Only few bigger companies are able to organise an internal training centre.

Informal learning is done on the job during and after hours, exchanging experiences from different departments.

Informal learning processes
Informal learning is "organised" in one company – Biesse HDS in Pesaro. Company information and data related to design and development, new products, finished products, are made available on the company web site. Employees are encouraged to follow e-learning materials during their free time.

For the remaining companies, only a few utilise e-learning courses for a specific need, for example accounting or marketing. ICT companies seem to be more engaged in informal learning because of the need for continuous updating on technology.

In most cases intentional informal learning takes place – but it may be a problem that people are not aware of informal learning if they seek for information unconsciously.

Conclusions and Discussion

Due to the lack of consistency between the partners in interpreting the obtained data from case studies, conclusions are difficult to draw. The findings may, however, be seen as an indication of the predominance of non-formal learning processes in SMEs. The lack of formal ICT-based methods for learning is striking. Employees seem to rely on informal ICT based channels for learning, such as e-mail and internet search. Interpretations of survey results provide us with information indicating that ICT is seldom used for learning and training in SMEs. In general, the attitudes towards a culture encouraging problem solving in the companies are moderate. In Austria, the Netherlands and Spain, these attitudes are more positive than in the other countries. SMEs in all countries show positive attitudes towards sharing information and collective problem solving within the company. Sharing information with colleagues in the same profession, but outside the own company is valued less.

The major conclusion concerning learning with ICT in SMEs in partner countries is, thus, that SMEs do not use e-learning in the conventional sense of the word. That is, they do not buy courses on the internet or in any other electronic format and they do not educate themselves through the use of these courses. The reasons for this vary, but they seem to be shared by the different partner countries. Partner countries thus seem to share a common picture of needs and conditions of SMEs and how these conditions reflect their respective relation to learning.

Workplace learning is learning situated in the work practice and to understand how SMEs learn requires an understanding of their work. It is not sufficient to say that they learn informally, in doing their job. Rather, in order to view the role of ICT in their learning, it is necessary to analyse the type of practice they are involved in.

A general conclusion is that SMEs is a heterogeneous group and this ought to be recognised when discussing how SMEs relate to ICT and learning. Despite this, SMEs seem to have some common characteristics. A very strong characteristic is that they need to see an immediate return on investment. If they are to invest in learning and/or ICT there must be an obvious business focus. Another feature that unite SMEs is that they all regard human relations as a portal to learning.

However, there are more differences between SMEs than there are similarities. Some obvious ones, which probably influence the way in which learning with ICT is regarded, seem to be geographical location, sector, level of education of employees, the company's age, and age of the company's employees. The impact of these factors upon learning with ICT has yet to be explored. For instance, there is a need for scientific studies to clarify how the particular conditions of a certain sector relate to the learning needs of the sector and how these could be accommodated by ICT. Furthermore, an emphasis is put on the connection of learning/training of the SME with business development. ICT must be viewed as a part of a business strategy directed at the future. In relation to this, the question emerges as to how individual learning is related to the learning of the organisation? Does competence development for individuals result in business development?

Finally, for future research in the field of SMEs learning processes, we advocate a thorough ethnographic approach. The interview methodology applied in the reported studies was suitable for identifying certain structural characteristics of SMEs, such as size, branch, educational level, engagement in formal training, and presence of training policy, etc. However, to identify learning processes, strategies and attitudes towards learning and education more profound observation techniques are needed. An ethnographic approach would provide opportunities for observing how SMEs learn at their workplace. By observing how people communicate with each other and how they form communities of practice, the non-formal learning processes could be understood more precisely.

13. Models and Policies for the Support of Professional Development in SMEs Across Europe

Graham Attwell and Wilfred Rubens

The chapter examines seven models for the support of professional development in SMEs based on Attwell (2003). The models are:
- supply chain learning;
- umbrella agency;
- academic organisation;
- individual SMEs;
- cooperative model: cluster of SMEs;
- community or local government;
- incubator model.

These models support the professional development of employees and, with the exception of the "individual SMEs model", the models also support the company. Furthermore, in this chapter we describe how these models are practised in the participating countries. The question is: do these models apply for the countries that participate in the ICT VET research? Based on input from the project partners it can be concluded that almost all the models are applied in every country. According to the Austrian and Dutch partners, the community or local government does not play an active role in supporting professional development in SMEs. The Italian partner reported that the "supply chain model" and the "academic organisation model" function well in their country. Each of the model described in the report is accompanied by a summary of the advantages and disadvantages and of the policy implications. A wider consideration of conditions and policy issues applying to all of the models is included here.

The general description of the seven models is also applicable for larger companies. Of course, this is not the case for individual SMES and the co-operative model. The information about how these models are practised and the conditions and implications deal with SMEs in particular.

In this chapter the terms *formal* and *informal learning* are used. The term formal learning is used for structured or guided learning (organised) and the term informal learning is used for spontaneous learning. Furthermore, learning can be intentional (which can be formal as well as informal) for activities which have learning as the main aim, and unintentional (again formal or informal) for activities which focus on solving work issues as the main aim. Organisations that support informal learning facilitate this kind of professional development. They do not organise learning activities; they offer facilitation of informal learning.

Supply Chain Learning

A supply chain can be defined as

> *"a business process that links suppliers, manufacturers, warehousing, logistics, retailers and the end customer in the form of a linear integrated skill and resource pool with the aggregated goal of delivering a product or service. It encompasses all activities and the flow of information both upstream and downstream the chain and is associated with the transformation of a product from raw materials through to a finished product." (http://en.wikipedia.org/wiki/Supply_chain).*

In the last five years the popularity of "supply chain learning" has increased. According to Masie (1999) supply chain learning refers to support for learning new knowledge and skills and to the assessment of competencies for the supply chain of a SME, including:

- Customers
- Prospects
- Suppliers
- Contractors
- Partners
- Regulators
- Employees

The most important driver of supply chain learning is the need of suppliers to get more of a grip on the variables that impact on cost, revenue and productivity (Masie, 1999). There are formal and informal forms of supply chain learning, including:

- Formal learning with ICT: web based training for new products;
- Formal learning without ICT: product demonstrations for contractors;
- Informal learning with ICT: online knowledge base for system administrators;
- Informal learning without ICT: informal meetings for business partners

In supply chain learning, small and medium enterprises are mostly the learners. The employees attend courses or are part of communities of their suppliers. For example, a pharmacy assistant attends a half-day session organised by a producer of a skin care product. Or a cook visits a demonstration of a new kitchen machine. Furthermore, it is possible to provide learning activities for end users.

Advantages and disadvantages of the model

Advantages

In the supply chain model, learning is closely linked to business practice. Learning takes place in response to the changing needs of production and through the process of innovation and business development.

The model also has considerable advantages through the potential for sharing of learning resources and infrastructure and through linking learning to shared knowledge development. Larger companies are frequently willing to provide re-

sources for learning for SMEs within the supply chain in order to improve quality and increase productivity.

Models for learning in supply chains are less rigidly tied to traditional patterns of training than in other models and supply chains can foster and support the development of dispersed communities of practice involving workers from companies throughout the supply chain.

Disadvantages

There are also potential disadvantages. Because of the close links to the production process, supply chain driven learning may be limited to those subject areas and competences required by present business practice, limiting individual ‚interest driven learning' and restricting innovation in individual SMEs. Furthermore the model may create a dependency culture, where opportunities for learning in SMEs are controlled by larger companies. The interests of the suppliers, though they may overlap, are not necessarily consonant with those of the SME. Learning can come to be seen as something that is merely a contractual requirement, rather than part of an indigenous learning culture.

Policy implications of the model

There are a number of different policy measures for supporting supply chain learning. The major and obvious measures to support the organisation of supply chains in different industries. In Wales and Spain, there have been a number of initiatives to support the development of supply chains including in the motorcar industry and in aerospace.

At a policy level it is also possible to support initiatives to bring supply chain producers, including large companies and SMEs, together with education and training providers and to subsidise learning provision within the supply chain.

If policy initiatives are undertaken at regional or national level to support supply chain based learning, this does beg a number of issues. Should specific support be given to SMEs in the same sector but who are not presently parts of a particular supply chain? How can supply chains be supported when they span across regional and national borders? Supply chain training tends to be product specific; to what extent can commitment be expected from suppliers beyond the support for these specific products.

Furthermore, learning in supply chains tends to be focused on the particular needs of the business process. There is obviously a possible tension between the *natural* learning engendered by the needs of the supply chain and learning promoted through national qualification frameworks and structures.

Supply chain learning applied in the participating countries

Supply chain learning seems to be widespread in Europe, although supply chain e-learning is probably applied on a much smaller scale. The suppliers' offer learning opportunities; SMEs do not offer courses for their customers. SMEs do not

always have to pay for this type of learning. In some cases, suppliers demand that SMEs ask their employees to attend courses offered by the suppliers. In each country, we found examples of this model. Examples from the automobile industry were given in Austria, the Netherlands and Spain. Companies like Ford, Toyota, Volkswagen and IVECO often provide face-to-face courses, web-based training, CD ROMS, (online) tutorials and knowledge databases. Furthermore some car manufacturers have their own competence profiles (for engineers). Such formal learning is mainly compliance driven. Multinationals car manufacturers require learning based on their quality standards. Supply chain learning also takes place in other sectors (e.g. pharmaceutical industry, ICT sector). An example from Italy is BIESSE, an industrial group that created an SME, a corporate school, for training purposes. Among the small enterprises that are part of the BIESSE Group is HSD (a SME with 120 employees). They use ICT intensively. They have developed an extranet which is used for the group supply chain as well as a website for business-to-business customer relations. Supply chain learning has been strongly developed in Poland. An example is Polish Telecom with its Marketing Academy of Telecommunication Services. They provide courses for their retailers.

Umbrella Agency

An "umbrella agency" is an organisation that represents other organisations. In many cases SMEs are members of an umbrella organisation. Examples of umbrella agencies for SMEs are branch or sector organisations, chambers of commerce and national or regional associations of SMEs.

Umbrella agencies can have important tasks in the professional development for employees from their member companies. Umbrella organisations are generally focused on formal learning in terms of courses and training sessions. Possible activities are:

- They develop competence profiles, which form the basis for schools to develop curricula. Furthermore, these profiles can be used by training institutes (for competence development, life long learning) and employers can use these profiles for human resource management (personal development plans, rewarding). Umbrella agencies, especially branch organisations, may provide tools for competence assessment (with or without ICT).
- They provide courses and training. In some cases they provide e-learning courses.
- They are responsible for exams and assessment. Schools (e.g. community colleges) provide courses and umbrella agencies (especially branch organisations) sometimes develop exams (based on competence profiles).
- They facilitate other initiatives for learning and training. Umbrella agencies may fund courses and training provided by other organisations. Therefore, the fee for SMEs to attend these courses and training can be low.
- Some umbrella agencies (especially branch organisations) can oblige employees

to attend certain courses. An example is for the employees of companies in the security sector. Compulsory courses are often provided around health and safety legislation.
- They advise SMEs about their human resource development. Umbrella agencies can help SMEs with the development of professional development plans and personal development plans of their employees.
- They inform their members on developments in technology, legislation, or new markets. Information can be provided by face-to-face meetings, by papers and journals and electronically (e.g., an electronic magazine, website, database).

Advantages and disadvantages of the Umbrella Agency model

Advantages

The major advantage of the Umbrella Agency model for supporting learning in SMEs is that the agencies and agency employees are usually part of the culture of the industry and sector. As such, they have an understanding of the problems that SMEs face and of the reality of learning within SMEs.

Therefore, they are well positioned to develop and support communities of practice within SMEs. Many umbrella organisations are formed on a regional basis and can link learning to innovation and economic development. Umbrella organisations are well placed to provide information and support to SMEs, allowing learning to be integrated with wider business development and with support in the implementation of information and communication technologies.

Umbrella organisations also promise economies of scale in providing and supporting learning.

In many countries umbrella organisations have a statutory role in the identification of occupational profiles and in the delivery and accreditation of initial vocational training, particularly through apprenticeship systems. At least in theory, they are well placed to understand the training needs of SMEs.

Disadvantages

In those countries where membership of an umbrella organisation is compulsory, there may be a tendency towards bureaucratisation. SMEs may view umbrella organisations as just another regulatory barrier to be overcome, rather than as a valued support mechanism. Many SMEs have very specific training needs and training provision by umbrella organisations may tend towards catering for the greatest numbers and thus fail to meet those needs.

Umbrella organisations may also tend to be dominated by larger enterprises, which provide the majority of their income. The needs and interests of larger enterprises may not be the same as those of SMEs.

In those countries where membership of umbrella organisations is not compulsory, they may lack the infrastructure to support learning in SMEs, and they are also sometimes seen purely as publicity mechanisms. Furthermore, SMEs tend

to view them as social clubs, often restricted to managers, rather than as business support mechanisms, and though this does not mean they do not support learning, it can be of a highly informal and unstructured nature.

There is some doubt as to the competence and understanding of umbrella organisations with regard to the use of new technologies or of their proficiency in e-learning. When training is provided by the organisations it has a tendency towards traditional delivery mechanisms. There is little evidence to suggest Umbrella organisations have an understanding of the importance of informal learning or of how to support such learning. Supporting informal learning and developing communities of practice may challenge the models by which Umbrella organisations have funded training provision for SMEs.

Policy implications of the Umbrella Agency model

There are four different levels of policy implications associated with the Umbrella Agency model.

The first relates to the degree of regulation in different European countries. In some countries Umbrella agencies are regulatory bodies and SMEs may be required to become members. This may entail annual payment of a membership fee and / or fulfilment of a number of conditions. On the one hand, compulsory membership of Umbrella agencies can be seen as a way of providing a rich level of support to SMEs and of guaranteeing employment conditions in enterprises. On the other hand, it can be viewed as an unnecessary layer of bureaucracy and legislation, hindering business start-ups and innovation. In some countries, umbrella organisations may have responsibility for implementation of national and regional policies.

Linked to the issue of regulation is the determination of training profiles and policies. In many countries, Umbrella organisations are integral to the development of occupational profiles and of training regulations. However, in other countries they have a far more limited role, acting more as business associations. Where they have less statutory power, they may have more freedom to implement innovative solutions. A further and more general policy issue is to what extent continuing vocational training should be regulated and what role Umbrella Agencies might play in that regulation?

From a policy point of view, there are decisions to be made as to what role state and regional governments should play in the establishment, structuring, governance and funding of Umbrella organisations. Should the structures be determined by the state or should this be left to individual sectors or regions.

Given that Umbrella organisations have so far played only a limited role in the development of e-learning, there is an issue as to whether incentives or grants should be provided to encourage such provision. There remains an issue as to how such provision might be evaluated. In offering training grants, governments and government agencies have tended to judge results by the number of training places provided or by outcomes achieved. Neither of these measures is appropriate to evaluating informal learning provision.

Nevertheless, Umbrella organisations might offer credible organisations around which to build distributed networks of practice on a regional or national basis. However, this would probably require funding provision.

Umbrella agency applied in the participating countries

Branch organisations, chambers of commerce and other umbrella agencies often play an important role in the professional development of employees, although the use of ICT for professional development is not widespread at present.

In Austria, the Federation of Labour and Chamber of Commerce support learning and training for SMEs. They have their own training institutions, which have developed and implemented ICT based learning strategies. Initiatives in which ICT based learning programmes were provided through regional tele-learning centres failed. The carpentry branch organisation in Vorarlberg, has set up its own training programme for apprentices. They try to implement the exchange of apprentices in different enterprises and to promote further training and learning. In general, SMEs tend to have lots of informal contacts and communication with Chambers, branch organisations etc.

In the Netherlands, branch organisations play an active role in supporting learning and training of SMEs and also provide information for SMEs. Several branch organisations (e.g. automobile sector, tourism sector) help SMEs in developing competence profiles and they provide online competence checks. They also provide courses, including online and blended learning, and exams. Dutch sector organisations also play an important role in the organisation of apprenticeships and in the recognition of prior learning (although much work remains to be done in this field). Formal learning is still the most important focus for branch organisations. But there are changes in this perspective. Dutch branch organisations have there own funding to stimulate the participation of employees in formal learning.

In Spain, the Wood Federation works with SMEs in a variety of ways: competency development, provision of courses, information etc. Most of the activities are focused on informal learning with ICT. Formal learning is provided but the main focus is courses on legislative requirements. Informal learning may also take the form of information provision through a portal. This organisation emphasises its role in changing the employees' attitude to learning. In Sweden, the umbrella organisation for small enterprises (Fretagarna), the chamber of commerce and the chamber of e-commerce support the use of ICT for learning in SMEs.

In Poland, the Polish Agency for SMEs (PARP) is the major national umbrella agency. It supports e-learning in SMEs by publishing courses on its web pages, by supporting e-learning implementation in SMEs, and by organising subsidised training using e-learning tools. Other umbrella agencies, such as the KIG (National Chamber of Commerce) concentrate their activities in Warsaw and the Warsaw region. Other chambers of commerce promote and support the use of

ICT in the development of SMEs and entrepreneurship by organising training and conferences in order to consult SMEs and meetings where employers and employees can meet specialists.

Academic Organisation

In this third model for support of learning and training in SMEs, educational institutions such as universities, professional education organisations or community colleges initiate learning activities for SMEs. Academic organisations develop courses and training sessions for SMEs. It is possible that academic organisations collaborate with networks of SMEs or umbrella agencies, but in this model they have the lead in the development of the learning activities. As the development of online learning activities is rather specialised work, it is possible that various academic organisations collaborate in order to provide learning and training for SMEs.

There are a number of different models for how academic organisations work with SMEs. At the simplest level this may just comprise the provision of e-learning or blended learning courses targeted at SMEs. These courses may be part of regular academic provision or may be specifically tailored to meet the needs of individual SMEs, sectors or groups of SMEs.

Academic organisations may also form consortia on a regional or even national basis to offer a wider range of provision for SMEs.

In some countries networks have been developed comprising of Umbrella organisations, governmental and economic development organisations and enterprises to develop more tailored training for SMEs, often involving the use of e-learning.

Vocational education and training institutions may include provision for SMEs as part of their everyday activities or for apprenticeship training. Many vocational education and training organisations have developed networks at sector and trade level with SMEs for shared professional development, for co-ordinating apprenticeship training, for assessing training needs or for developing work placements.

In addition to the provision of courses and training sessions, academic organisations also advise SMEs. A famous example is industrialist Sir John Harvey Jones who visited the factory of the Morgan Motor Company. He analysed the business and talked to the employees. The BBC produced a TV series about his activities. His interventions may result in informal learning activities in the company by stimulating reflection on the work and learning processes, and the way organisations can learn. Academic organisations conduct research in SMEs with the aim of developing new knowledge that can be applied by SMEs, for example on business processes or human resource development. Furthermore, their research methods, for example interviews with employers and employees, can stimulate reflection on work and learning processes. Consultancy and research by academic organisations is expensive. Many SMEs will not be able to finance these activities. Therefore, these activities can be undertaken through research and innovation

projects financed by the government (local, regional, national or European), by umbrella agencies or by the academic organisations themselves.

Advantages and disadvantages of the Academic organisation model

Advantages

There is a natural attraction to the idea of academic organisations as a model of training providers for SMEs, given their mission as providers of knowledge and learning. Furthermore staffs in academic organisations have extensive expertise and in most countries there is an advanced infrastructure for education and training provision. Academic organisations also have access to extensive resources.

Disadvantages

Academic organisations providing training for SMEs is the model most promoted in Europe. Given the lack of training provision identified in the ICT and SME project it should be asked as to why it has largely failed.

Firstly, unlike supply chains or even umbrella organisations, academic organisations have a different culture and ethos to that of SMEs. University research and teaching is often far removed from the workplace application for learning in SMEs.

Secondly, arguably driven by policy directives, academic organisations have tended to view SMEs as an extended market for the provision of services and products. In the e-learning field, these products are largely standardised. The pedagogic model is in contradiction to peer group learning and learning through communities of practice which constitutes the majority of learning in SMEs. Academic organisations are, in general, heavily wedded to course based models of training, be it face-to-face or utilising ICT. The facilitation of informal learning is outside the remit and experience of most universities.

Where the model has been most successful is where the provision of learning has been a secondary concern, linked to innovation or product development or research. This has allowed significant knowledge development and informal learning.

The model has also been successful where vocational institutions have sought to extend their provision to include regional economic development, innovation and networking.

Policy implications of the Academic organisation model

There are many implications arising from the academic model of provision for e-learning in SMEs.

Most important is the future role and organisation of the education and training system. Universities have traditionally been responsible for research and for higher education. Should this role be extended to the provision of learning and knowledge for companies and if so how should this be managed and funded?

Obviously universities can have a significant role in research and the development of knowledge for SMEs. However, present policies have tended towards the privatisation of knowledge with research increasingly being sponsored by large enterprises. SMEs are not able or willing to pay for research to be undertaken in universities, so an extended role would tend towards a model of more open licensing of knowledge development and product and materials innovation.

Similarly, there are decisions to be taken over the role of universities and higher education provision within local and regional economies. Should this be part of the mission of higher education? If so, the issue of funding is once more raised.

The role of vocational education and training providers may be less problematic but an extended responsibility for lifelong learning in SMEs would require changes in culture and considerable resources.

Present policies for e-learning development have tended towards a consumerist model of education, with institutions encouraged to develop and extend into new markets. The course driven culture of e-learning will not make significant impact in SMEs, nor are they are willing to pay for education courses. If educational institutions are to make a bigger impact as providers of continuing education and training and professional development, this will mean more attention has to be paid to informal learning and to supporting communities of practice. This would probably best be realised on a partnership model, bringing together institutional providers of learning together with economic and regional development organisations, social partners and enterprises. There remains a question as to how such partnerships should be managed and what should be the key goals.

A further policy issue is the training of teachers and trainers. It is generally accepted the state has a responsibility for regulating the standard of training of teachers in academic institutions in some form or other and to ensuring standards. Should this be extended to training or SMEs and to e-learning?

Perhaps the most important question is the relationship between education and training systems and informal learning. There is currently much attention paid to informal learning at a policy level. If informal learning could be systematised, it could be a cost effective route to increasing training. However in order to do this it is felt necessary to be able to measure the learning taken place - in other words to formalise that learning. As such the concern is to develop an exchange value to learning, which at present is seen only as having use value. That is not to say that exchange values are only in the interests of employers and policy makers. In an insecure labour market, exchange values are important for workers. However present proposals and mechanisms to establishing exchange value are based on identifying equivalents within frameworks linking informal learning to formally acquired qualifications and therefore seem more likely to constrain rather than support the use and status of informal learning. A better approach might be to recognise the use value of informal learning through profiling learning in non-constrained (e)-portfolios. Such an approach would provide a major move to learner driven learning where all learning is valid rather than only recognising that learning supported by qualification frameworks.

Academic organisation applied in the participating countries

The "academic organisation" model is widely implemented in the participating countries. Organisations including community colleges, professional education institutions, universities and private training institutes offer mostly formal learning activities for adult learners. ICT is increasingly used for these courses, usually as blended learning. In most cases, these courses are not tailor-made and not focused on the specific needs of the learners who attend the courses.

In Austria, some universities have started to offer tailored courses for employed people (using ICT based learning materials and blended learning settings). Other universities have already started to offer entire courses, (e.g. the University of Linz in Law) in blended learning scenarios. These initiatives are not tailored to the needs of SMEs, but to the needs of the individual participants. There are some institutions at the four universities and "Fachhochschulen" in Innsbruck that focus on the needs of SMEs (e.g. the 'Centre for entrepreneurship'), but currently it is not possible to assess what their impact is.

Sometimes it is more effective for an Austrian academic organisation to work 1-1 with an SME: students have to do six months of practical training at an enterprise before they get their degree at the university. They are paid up to 700€ per month, which makes them very interesting for SMEs. This also means that universities have developed considerable contacts with companies in order to facilitate the practical work of their students.

In the Netherlands, private training institutions, community colleges and universities of professional education offer courses for SMEs. Recent research (CBS, 2005) shows that in 2003, 15% of all Dutch adults attended post-initial education (a growth of 3% compared with 1995). About 40% of employers fund learning for employees.

In Spain, Florida University provides an example of this learning model. Florida University provides both face-to-face training and online courses together with rural co-operatives. An example is a community of practice for IT workers in small SMEs. The university's Social Economy portal includes information and advice for SMEs. Whilst the focus of academic organisations is often on formal learning, this Spanish institution supports many informal learning activities as a side effect of consultancy activities. There is a network between the Florida institutions and local. Other local academic organisations are also active in this way.

In Italy, training organisations are considered fundamental in order to help SMEs understand their internal training needs and develop answers for their business-related problems. In Sweden, Expert-kompetens (The Knowledge Foundation) supports the use of ICT in education. Furthermore, Swedish umbrella organisations and academic organisations collaborate in supporting e-learning in SMEs.

"Progress & Business" Foundation, Technology Transfer Centres and distance education study centres at the Polish universities support the use of ICT in SMEs. For example, the AGH University distance learning centre offers e-learning courses to SMEs, mostly in ICT skills. The Technology Transfer Centre of the "Progress & Business" Foundation has implemented CRM and e-learning platforms for

enterprises in the Maopolska region in the furniture, automotive, electro-technical and automation, and IT sectors and has developed e-learning content on enterprise finance and project management for these enterprises. Many such initiatives are supported within European projects.

Individual SMEs

This model does not support the company; it supports the professional development of employees.

Many learning activities take place in individual SMES. Examples include:

- Colleagues who discuss work-related problems with each other.
- Managers who inform their employees about recent developments in the sector and their impact on the business processes of the company.
- Employees who discuss new tools to be used in their work.
- Courses organised, for example, in order to introduce a new technology.
- New employees who attend an induction programme.
- Learning by trial-and-error, for example, a shop assistant who learns how to use a new cash-system.
- The use of a CD ROM, for example, secretaries who use a CD ROM to learn how to use a spreadsheet programme.

According to Jay Cross (2003,) 80% of learning activities in companies are informal, whereas 80% of the resources are spent on formal learning activities. This is what Cross calls „the spending/outcome paradox".

The advantages and disadvantages of individual SME model

Advantages

This is undoubtedly the most common model for the use of ICT for learning and professional development in SMEs although it is seldom acknowledged as a model, rather just being regarded as practice. This model is heavily based on informal learning.

However, it does have some advantages as a model. Learning is situated and meets the needs of both individuals and the enterprise as a whole. Learning is applied in practice. In effect, learning is not confined to the individual enterprise but take place through interaction with dispersed communities of practice mediated though the internet. Learning can be closely targeted to meet needs. It may also be a cost effective means of learning, and through integration of ICT based learning with daily practice may be highly effective in terms of results.

Disadvantages

The model is highly dependent on the work organisation, which in turn depends largely on individual managers. Whilst some SMEs offer a rich learning environment, in others little learning takes place. Informal learning is also linked to the

degree of responsibility individual workers have for the work process. Individuals have little determination over the environment, which affects their learning.

Since informal learning is usually not accredited, there may be problems in recognising the learning. This may not be an issue until an employee wishes to seek another job. How can they then prove the learning, which has taken place and the new skills and knowledge they have developed? There is evidence to suggest this may also be a problem for employers who are unable to rely on formal education and training certificates as a reliable way of judging the abilities of potential new employees.

The policy implications of the individual SME model

If work organisation is a strongly linked to the provision of informal learning opportunities in SMEs, then consideration needs to be given to models of business support for SMEs. In most countries, responsibilities for training and learning and for economic development are divided between different government ministries and agencies. In many countries different agencies or projects and initiatives are responsible for advice and consultancy - and in some cases financial support - for SMEs for encouraging innovation, business support and development, support with marketing and product development, support for work (re) organisation and for education, training and learning. It might be of help if these services were to be linked - so that if a company was designing new products then the learning implications were considered at the same time. However this could cause problems in that the provision of the different services requires different knowledge and skills and the provision of a more joined up service would be hard to co-ordinate.

However, the aspect of learning - both formal and informal - should be a major consideration in developing services to support SMEs. At present there is limited evidence that this is so.

Present agency provision for learning or SMEs seems to focus almost exclusively on formal learning. The only attention to informal learning is through measures for accrediting informal learning within formal education and training frameworks and structures. More attention could be paid to the encouragement and fostering of informal learning in SMEs.

This might be best facilitated at policy level by supporting the development of networks, which could themselves develop and support communities of practice. As this report shows, these networks can be organised at different levels, through supply chains, through educational institutions, at a sector level or on a regional basis. This would require policy bodies working in collaboration with other organisations to support and foster learning through communities of practice.

A further way of recognising informal learning would be to encourage and support the development of (e)-portfolios at a broad level. Whilst a number of regions have introduced portfolios in the education sector, this initiative could be extended to lifelong learning and to SMEs. This would require considerable support but could have a major impact.

The Individual SME model applied in the participating countries

The ICT and SME project research suggests many learning activities take place in SMEs. This learning is mainly informal, spontaneous (not organised) and face-to-face. Employees and managers classify this as work and not as learning. As a consequence, facilitation and support for informal learning within the company is limited.

In some cases SMEs use ICT for informal learning, especially if the employees work in different locations and if they are used to working with ICT. But, in general, most informal learning takes place face-to-face. Formal learning, organised by the SME itself, is in general not facilitated by the use of ICT. Tailor-made e-learning applications and content seems to be too expensive for SMEs, although a recent study by Brandon Hall shows that 66 percent of all LMS implementations (learning management systems) are inside medium to small- sized companies, with most companies averaging 75 employees (TMCnet, 2005). Hall's research was done in the USA. European figures are not available. A possible explanation for this difference could be that American SMEs are more willing to invest in ICT than European SMEs.

In Austria, managers identified several types of (informal) learning processes in the enterprises, including training on new machinery, desktop sharing, communication through email and phone and face-to-face about problems to be solved and other issues. In previous research, one example was found of a software enterprise running its own internal "Academy" for training purposes. In the Netherlands, several high technology companies, involved in the ICT and VET research project, developed instruction programmes for new employees. The knowledge needed for the job was very specific and new employees did not learn it at school. Additionally, pharmaceutical companies organise meetings where the manager or an employee talks about new developments. In a training institution, a new employee has the opportunity to attend a course, which is provided by a colleague. In some cases ICT is used to support learning. At the request of one company, a tailor-made e-learning course has been developed for working with new machinery. In the Dutch training institute mentioned above, MSN has been used for hands-on support for solving work-based problems.

In Spain, this model is probably the most used. Employees share knowledge and use ICT (mainly phone and email), although it is not recognised as learning.

Polish SMEs use publicly available content for e-learning within the company, if they apply e-learning.

6. Co-operative model: clusters of SMEs

SMEs can have different reasons for co-operating in the provision of training and learning. Firstly, they may have the same interest in training and learning, for example when they are part of a franchise organisation that sells the same services and products. It is important that employees of different SMEs of this franchise organisation work according to the same standards. Another example is stores in

a shopping centre that have to share security systems (and learn how to use them). A third example is a network of SMEs that organises informal meetings where they discuss issues such as the impact of technology on their companies. These clusters of SMEs are regionally or locally based.

These clusters of SMEs can be organised in a more formal way (e.g. as a member of a franchise organisation), or can be more loosely connected. In a co-operative model, SMEs can share infrastructure, materials (for both work and learning) an/or learning activities. The network of SMEs might be based in the same sector or on a geographical basis. This origin of a network influences the nature of learning: sharing the same sector or being member of a franchise organisation could lead to a focus on formal learning activities (with learning as an aim of the activity) and sharing a locality might lead to more informal learning activities (with solving work problems as aim of the activity). Learning activities are often voluntarily and social interaction is very important, especially in networks in which SMEs are loosely connected.

Advantages and disadvantages of the Co-operative model of clusters of SMEs

Advantages

There are a number of advantages for this model. Firstly, it is based on the practice and culture of SMEs. Secondly, it allows collaboration in business development and the provision of products and services to be combined with collaboration in learning provision. The model can naturally lead to the development of communities of practice. The model also promises considerable cost benefits through the sharing of facilities and resources. In terms of ICT, it may be possible for clusters of SMEs to share common infrastructures. At least in theory, SMEs are able to share skills and knowledge to mutual benefit and to collectively overcome different problems

There is considerable research on innovation and the emergence of clusters of SMEs in the same sector on a regional basis. Clusters of SMEs working together can develop and share knowledge leading to innovation.

It should be noted that versions of this model are increasingly used for the training of apprentices, with apprentices gaining different experience and skills in different SMEs.

Disadvantages

The disadvantage of this model is the perceived competition between SMEs. Research tends to suggest that the competitive knowledge held by an individual SME is quite limited, but SME owners often perceive this otherwise. This has probably held back the development of this model.

Policy implications of the Co-operative model of cluster of SMEs

It is possible to develop a proactive policy for encouraging the formation and development of clusters of SMEs. Clusters of SMEs could be provided with support

either through direct funding or through the provision of business services.

Clusters of SMEs may form the ideal basis for networks for innovation and learning at sector, regional and sub regional level. Once more, these networks may require support. Furthermore, policy bodies and economic development agencies may have a role as actors within such networks.

Policy makers can play a role in encouraging the integration of education and training providers within clusters of SMEs. It may also be possible to provide infrastructure support for clusters.

Cooperative model: cluster of SMEs applied in the participating countries

Small and medium sized enterprises often collaborate in clusters. The purpose of this collaboration in most cases is not focussed on formal learning and sharing business-critical knowledge, but for example, on sharing information about trends within the sector. A possible reason is competition between the SMEs.

Membership of a sector organisation is often the basis for the development of informal networks between SMEs. In these networks much informal learning takes place, especially amongst managers.

In Austria, one of the most important problems for clusters is mutual trust – data security is an important issue. Yet, in Austria, the co-operative model is popular and the Austrian government and the regional governments support the creation of clusters. In the Tyrol, there are at least eight very active clusters, for example in bio-science, alpine technologies, wood engineering and 'wellness'. Overall, there are more than 100 such clusters of SMEs in Austria. The most important are in the automobile sector. In the Tyrol in most clusters a leading enterprise there are very few large enterprises. The clusters have very different organisational structures, ranging from very loosely connected companies to a very active and cohesive network of SMEs. In general, enterprises collaborate in projects, which they could not do alone and they communicate intensively. Clusters of SMEs have proved to be successful in allowing SMEs to combine resources in order to tender for larger contracts.

In the Netherlands, the co-operative model is limited. Some franchise organisations organise courses for employees of their members.

In Poland, the National SME Services Network (KSU) – the voluntary network of non-commercial organisations operating under the Polish Agency for Enterprise Development (PARP) - delivers innovation services to SMEs, including training and consultancy.

Community or local government model

Another model of learning and training in SMEs is the community or local government model. Local governments can co-ordinate and facilitate learning activities. For example, local governments are able to finance an infrastructure for (online) learning. Furthermore, they can organise meetings for SMEs or they

can disseminate good practices and "lessons learned". Finally, the local government can play a direct role in supporting local or regional umbrella organisations, or an indirect role through their relation with community schools for vocational education, for example by co-ordinating a regional task force to stimulate the regional knowledge economy.

Advantages and disadvantages of the Community or local government model

Advantages

Local governments can play a play a potentially critical role in providing the infrastructure for e-learning. They also are ideally placed to bring together networks of different education and training providers and local economic development agencies. In this way the provision of learning for SMEs can be integrated with regional and local economic development and the provision of infrastructure - for instance wide area and wifi networks.

In many countries, local governments are responsible for the provision of non formal and community based education. There is some evidence that individual SME employers are accessing non formal education programmes to update their skills and knowledge. This provides a potentially broader learning environment than the more work focused informal learning in SMEs.

In many countries, local governments co-ordinate statutory education and training provision. As such, they are well placed to extend and focus that provision for SMEs.

Local governments could play a critical role in planning and co-ordinating funding interventions and the development of innovation in e-learning.

Disadvantages

Whilst local governments may have expertise in the organisation of formal and non formal education and economic planning and infrastructure, they are not part of the culture of SMEs, or of learning in SMEs. Most of the focus is on formal education, rather than in facilitating informal learning.

Local government provision may be seen by SMEs as overly bureaucratic.

Policy implications of the Community or local government model

It is an overall policy consideration as to whether local governments should be given policy responsibility (and commensurate resources) for developing learning in SMEs or whether that responsibility should rest with regional or national bodies.

There is an issue as to what extent local government should act as a service provider, reflecting nation government priorities and as to how far it is able to shape its own priorities for a locality or region?

Similarly there are different viewpoints as to what the role of local government should be in providing ICT infrastructure.

If local governments do have some responsibilities for (e)-learning in SMEs there are different models for how this could be provided. Some local governments have set up support centres for SMEs, dealing with both ICT support and e-learning, others have chosen to develop networks of local education and training providers with shared infrastructure.

Community or local government applied in the participating countries

In several countries, the role of local government in supporting e-learning has been discussed. The main policy issue is whether the government should take responsibility for learning and training in SMEs or if the market is responsible for innovation and learning activities? How should the government intervene?

Perhaps that is why this model is probably the least common for supporting learning and training in SMEs. In several countries, local or regional government support learning and training in SMEs indirectly, for example through tax relief or funding. Furthermore, a number of governments have implemented legislation or initiated the development of qualification frameworks and quality assurance measures. In Austria, local and regional governments support SMEs by developing broadband initiatives.

Direct involvement by governments is mostly focussed on the job creation for unemployed people. One exception is the Spanish SME service (IMPIVA), whose web portal provides information and advice, and to a limited extent, consultancy, for enterprises. In the Netherlands there is a similar initiative, although this is not through the government, but from an umbrella organisation for SMEs.

In Sweden regional initiatives by SMEs for professional development of their employees are financially supported by a government agency.

OpenPoland.org supports Polish SMEs in implementing Open Source Software. Both community and local government have been gradually developing entrepreneurship support programmes, including – but not restricted to – the use of ICT in Polish SMEs. Moreover, local governments initiated the Regional Innovation System (RIS) and promote e-learning in SMEs through the development of the alternative educational network for innovative development in the Malopolska region. Finally, at a national level, the Polish government plays an active role supporting the use of e-learning in SMEs. The Ministry of Science and Information Technology is responsible for overall ICT policies in Poland including e-learning for the SMEs sector. The Ministry of Economic Affairs & Labour supports SMEs by financing the implementation and use of ICT. The National Contact Point Research EU Projects, co-ordinated by Institute of Fundamental Technological Research of the Polish Academy of Sciences, encourages SMEs to create international consortiums by organising training, workshops and conferences on opportunities to take part in EU projects on e-learning.

Incubator Model

An increasingly popular model of support for SMEs is the incubator model, particularly in the ICT sector.

Incubators typically provide a 'walled space' for SME start-ups, providing shared infrastructure and business support. In some cases companies also receive start-up grants and incubator units assist SMEs in accessing public funding. Usually, SMEs are granted membership of an incubator for a fixed period of time, the idea being to support then until they are able to establish their own facilities.

Incubator units may be established by universities for spin-out companies. Incubators may also be established by local governments or other economic development organisations to promote business start-ups.

Incubators may be focused on single economic sectors - typically new technologies - or may include companies from a variety of sectors. There is considerable variation in the size of incubator units.

Incubator units often form part of innovation zones or university business parks.

Advantages and disadvantages of the incubator model

Advantages

Incubators facilitate informal learning and knowledge exchange between different SMEs. These links and networks often persist even when a company has left the incubator unit.

Incubators can also be extremely effective in providing non-formal learning provision, especially in areas related to business start-ups.

Incubators are a cost effective means of providing business support and also of providing support for learning. When located close to universities or innovation centres, they are able to develop knowledge exchange and utilisation, encouraging closer links between research and development and SME formation.

Incubators are well placed to develop networks of practice

Disadvantages

It can be difficult for enterprises to move outside incubators and to establish themselves independently. Alternatively, incubators may become blocked to new enterprises with existing members not wishing to leave.

Incubators are typically designed for new businesses so this model offers little to existing SMEs.

Policy implications of the incubator model

Obviously incubator units need some level of funding, be it from a university or from local or regional governments. There is also a policy issue in who should control and manage incubator units.

At a policy level, incubators may be seen as an attractive option for developing closer links between research and development and economic growth and the job creation.

There is an interesting policy issue around the success of incubator units. If they are as successful as it seems in encouraging and supporting what are essentially clusters and networks of SMEs, could this provide a future model for business organisation? Instead of requiring SMEs to leave an incubator unit after a certain time, existing clusters could be consolidated and expected to increasingly contribute to the cost of the unit and the establishment of new incubators. This might provide a sustainable model for business start-ups.

Incubator units could be seen as an infrastructure for developing wider distributed networks of practice based on knowledge exchange and informal learning between employees.

The incubator model is rather new, but already important in several countries. Nevertheless, many incubators do not focus on the support of formal learning directly.

In Austria, incubators play an important role. In Tyrol, several of these incubators have a different focus of interest. CAST, for example, focuses on academic spin-outs and K+ centres on specific branches whilst the Tiroler Zukunftsstiftung offers more general support.

In the Netherlands, incubators focus on the provision of venture capital funding and facilities (e.g., premises, technical infrastructure, or management support). In some cases, incubators provide opportunities for networking, coaching and advice and training (e.g. simulations about the set up of a company).

In Spain, various incubators exist (e.g. Florida University has its own incubator) and provide support for informal learning, advice and consultancy. A wide range of small companies utilise this service. Learning is partly ICT based, and information is available through web portals.

In Sweden there are some initiatives to establish incubators, although it is unknown how successful these are.

Summary of the Models

The supply chain model, the umbrella agency model and the academic organisation model are probably the most common models for supporting (the use of ICT for) learning in SMEs. The popularity of incubator model appears to be increasing. Incubators often provide support for learning. Whilst suppliers, umbrella organisations, academic organisations, (networks of) SMEs, communities, local governments and incubators seldom use ICT for formal learning (although there are exceptions), these organisations do use ICT to support more informal forms of professional development.

Developing support for SMEs

The main purposes of the different models are the increased competitiveness of SMEs, economic development and job creation. Support for learning and training is important in this regard. Different countries and regions have adopted different models. To some extent this may be dependent on political systems. For example, in liberal economic policies limit the role of the government.

The following section considers how the different models might be extended to support professional development (with or without ICT) in SMEs.

Awareness

Many SMEs lack a rich learning culture. They often regard learning as a cost, rather than an investment. Learning is perceived as a formal activity, separate from the work process. Employers and employees in SME need to be aware of opportunities for professional development and the positive benefits of learning for the enterprise.

In addition, SMEs should be aware that there are other forms of developing, sharing and utilising knowledge than formal learning and of the opportunities for using ICT. If this is the case, learning - "but not as we know it"- could be central to business development. European and national governments can take the initiative to develop a strategy to increase this awareness. Together with sector organisations and academic organisations, the government can develop an action plan to stimulate professional development (informal, formal, organised and spontaneous) for employees of SMEs.

A new approach to learning

Not only SMEs should be aware of the critical impact of new forms of learning. Currently, training organisations and organisations that support learning in SMEs in general (e.g. umbrella organisations and academic organisations) tends to focus on formal learning with limited use of ICT. Informal (e-)learning is seldom recognised. Training organisations and academic institutes often use a different "language", to SMEs. A new vocabulary of learning could be created. Universities could play a role in this since the development of learning theories is their "core business".

The outcomes of this discussion can lead to the redesign of training programmes, qualification systems and e-learning content. Umbrella organisations and incubators can develop new services for SMEs based on more informal processes and service provision. A national network organisation might be set up to support these organisations in this process. This network organisation could be a joint effort by umbrella organisations and universities. The government may have a facilitating role.

Infrastructure

Increasingly services are provided through the Internet. The Internet is becoming business-critical for SMEs. Therefore SMEs are more and more willing to invest in the ICT-infrastructure. However, in some regions, especially in rural areas, there is no access to broadband connections, or broadband services are prohibitively expensive.

Broadband internet could be regarded as a public utility like electricity or water, and therefore require government regulation or investment.

In terms of infrastructure, it is important to provide support for SMEs in the use of ICT. Most SMEs lack dedicated technical support staff. Umbrella organisations or clusters of SMEs could provide help-desks to support SMEs with technical issues. Furthermore, they could provide hosting facilities for e-learning applications or access to simple but powerful technology (e.g. social software [1] (http://en.wikipedia.org/wiki/Social_software)), since SMEs lack resources to install and maintain e-learning applications in their own company.

Legislation

On the one hand, national legislation can stimulate e-learning. On the other hand, it can also act as a barrier. For example, in the Netherlands there are collective labour agreements. This is an agreement between one or more categories of employers and employees, who regulates the conditions for work in individual labour agreements. In such an agreement, rules are formulated about how much time can be spent on learning and development. But, it is also possible that collective labour agreement limits provision to formal, face-to-face learning. This can hold back the development of e-learning.

One recommendation is that a regional or national task force analyses legislation to identify barriers to the implementation of (formal and informal) e-learning.

There are interesting experiments with 'rule free zones'. These are regions or areas with limited legislation and administrative requirements for enterprises. The assumption is that these zones stimulate entrepreneurship and a feeling of self-responsibility. Collaboration between umbrella organisations and the government is needed to establish such zones.

Funding

It is possible to support participation in e-learning through funding. Sector organisations may establish funds for this. National or regional governments may enact tax measures to stimulate learning. Individual employees may receive vouchers for the participation in (informal) e-learning. This can be financed by the sector (through a labour agreement) or by the government. Suppliers, branch organisations, incubators or governments can finance the development of new learning provision and the redesign of current training and courses. In the long term, the cost of learning for SMEs can be reduced.

Since the incubator model for the support of e-learning in SMEs appears

promising, the government, branch organisations and universities could form joint ventures to develop this model. Even large corporate organisations (or venture capitalists) can participate in these joint ventures.

Open educational resources and standards

Stephen Downes (2005) describes trends as a result of the changing nature of the internet and its use. According to Downes, these changes "are sweeping across entire industries as a whole and are not unique to education; indeed, in many ways education has lagged behind some of these trends and is just beginning to feel their wake." Not only education has lagged behind these trends, human resource development in general is probably rather conservative in adopting the internet. One of these trends is the growing use of free and open source software, open content and open access to existing knowledge. In general, this is called "open educational resources" (OER). People share their knowledge and products with others. Through this, they all become 'smarter' and therefore more competitive. For traditional companies this is quite revolutionary. They often believe that sharing knowledge with others makes the company less competitive. But as Prusak (1997) made clear, the competitiveness of a company is based on how fast it is able to transform knowledge into added value for customers. According to Prusak, knowledge, in itself, does not influence competitiveness. The way that knowledge is applied (and how fast) makes a company more or less competitive.

Umbrella organisations, suppliers, academic organisations, government, and incubators should promote the use of OER, not only because open source software is less expensive, but also because sharing knowledge is assumed to be a condition for the improvement of competitiveness of SMEs (Prusak, 1997). Communities can be created where SMEs can share knowledge about issues that do not concern their primary work process, although they are critical for successful work. For example, managers of garages can share knowledge about health insurance for employees but they do not discuss technological developments in the motorcar business.

An important condition for sharing knowledge is standards. The organisations, involved in the models, should promote and use e-learning standards and open specifications.

14. Searching and Lurking and the Zone of Proximal Development – What Do our Findings Mean?

Graham Attwell

The Leonardo da Vinci ICT and SME project has undertaken an extended literature review, a series of policy interviews, a survey of more than 350 SMEs, focus group meetings and perhaps most importantly, around 90 case studies in the seven different countries. The case studies took place between 2002 and 2005 and were based on a semi-structured interview. This chapter attempts to analyse the overall findings of the SME project and consider their implication for research and for policy.

The findings presented are based mainly on case studies, whilst the analysis of the findings is based on a wider review of literature and research in pedagogy and learning. Whilst, in general the findings were similar in the different countries, the paper draws mainly on the results of case studies undertaken in Wales in four sectors - ICT, tourism, engineering and manufacturing. Enterprises were selected for the case studies on the basis of being representative of the target group. However, we would not wish to pretend in any way that the enterprises sampled are a representative or either the regions or the sectors as a whole. It was not the aim of the case study activities to undertake a representative study, even if it had been feasible. Instead the case studies were seen as a source of rich data, to be aggregated with the other research findings of the project. The findings are confusing in that the patterns of use of ICT vary greatly between different enterprises. Nevertheless, we believe it is possible to advance some tentative hypotheses about the use of ICT for learning in SMEs and to extrapolate some lessons for policy development and intervention.

The following section explains the main findings of the study.

The realities of e-learning practice in SMEs

Education and training policies

Few of the enterprises studied had a formal policy for education and training. Neither did they have a budget for training or was there any individual with formal responsibility for training. This is not to say that managers were unaware of the importance of the skills and knowledge of their workforce. They saw those skills as being acquired through recruitment of skilled staff or from informal work based learning. Most SME managers saw their staff as having a personal responsibility to acquire new skills and knowledge as part of a collective responsibility for the company's profitability and growth.

Attitude to formal qualifications
Few of the enterprises were greatly concerned with formal qualifications, other than in those limited areas – such as in the restaurant and food industry – where formal qualifications were a regulatory requirement. Previous experience was seen as much more important. One enterprise said they did not even look at qualifications on an application form but relied totally on job interviews. All of the SMEs had strong involvement in informal sector and / or geographical networks and these networks were often the source of new recruits, rather than job advertisements and formal recruitment procedures.

Limited formal training and learning
As might be expected given the lack of formal training policies, there was very little formal training, either face to face or using ICT. Where formal training was seen as necessary, or where formal training was required for regulatory reason, enterprises tended towards buying in participation in face-to-face courses from public sector education and training providers. Where this was unavailable, private trainers were used and selection was on reputation obtained through word of mouth.

Little knowledge of e-Learning
Few managers or staff in the SMEs we studies were aware of the potential or possibilities of ICT for formal learning. None had received any information from public bodies in this area. Although some had received advertising material by post, this had been seen as junk mail circulars.

Much use of Information and Communication Technologies
Whilst obviously the use of ICT in the workplace varied according to sector and occupation, SMEs were using computers extensively in their day-to-day business operations.

Users of ICT included:
- For administration and accounting
- For business to business transactions (including trading through e-Bay)
- For customer communication
- For advertising and promotion
- For stock control and logistics

From our interviews it would appear that the use of ICT in SMEs is increasing, particularly for e-commerce and for business to business transactions. A number of the enterprises felt they were not exploiting the web as fully as they should and were planning further activities in this area. The particular areas of concern were that whilst the web was being used for business to business transactions with suppliers, few of the enterprises were themselves offering sales or services through e-commerce. A number of the enterprises also felt their web sites to be amateurish and offered little functionality.

Much informal learning

In contrast to the paucity of formal learning provision in the SMEs we studied, there was a great deal of informal learning taking place. From our study most informal learning appeared be learner driven, rather than planned in conjunction with others in the enterprise, and was problem motivated, although some learners were motivated by their own interest rather than in response to any specific problem. In many cases ICT was being used as part of this informal learning. The main means of ICT based learning was Google key word searches. Managers were often unaware of this learning, although they were frequently aware of the problem, which inspired it.

There were considerable differences in the use of ICT for informal learning between different enterprises. It would be tempting to ascribe these differences to age, sector, size or occupation but it is hard to discern such causal factors from the case studies undertaken.

Work organisation a key factor

The major causal relationship, which appeared was the link between work organisation and the use of ICT for learning. ICT was most frequently used for learning in those enterprises with flatter hierarchies and more devolved decision taking responsibilities and in which employees had greater autonomy in the organisation of their own work. Interestingly, these enterprises also tended to have a more experienced workforce and low turnover of employees.

Conversely, hierarchical work organisations tended to have the least use of ICT for learning. In some cases only managers and administrative staff in these enterprises had access to computers and the internet. There was no evidence of any organised support or informal learning – either face to face in the workplace or on-line. However, in some enterprises the learning acquired was discussed with peers as part of everyday collaboration and team work.

No accreditation of learning

None of the employees in the enterprises we studied had attempted to claim recognition or accreditation for the skills and knowledge gained through informal learning. It is not clear if this is because they are not interested in pursuing further formal qualifications or if it is because they are unaware of any opportunities of claiming accreditation for informal learning.

No general shortage of ICT skills

In general, SME managers did not perceive of any shortage in ICT skills in the workplace. They appeared of the viewpoint that younger workers especially had sufficient ICT skills to meet enterprise needs. However, two enterprises referred to problems in updating their web sites due to lack of skills.

Learning and Knowledge Development in SMEs

The following section explores the findings of the study of the use of ICT for learning in SMEs. It looks at both implications in terms of learning theory and examines what they mean for policy and practice and for the future development of e-learning.

Information or knowledge and the nature of informal and non formal learning

Perhaps the most significant finding is that instead of consuming pre-sequenced learning objects and programmes, ICT is being used for informal learning. In order to discuss this finding it is necessary to look more closely at the nature of informal learning. Definitions of informal and non formal learning are problematic and contested. Helen Colley, Phil Hodkinson and Janice Malcom have undertaken an extensive review of literature on this subject. In the review they identified eight different theoretical models of informal or non formal learning. They suggest the following factors as being common in many if not all of the definitions:

- "Process. This includes learner activity, pedagogical styles and issues of assessment: that is, the learning practices, and the relationships between learner and others (tutors, teachers, trainers, mentors, guides).
- Location and setting. Is the location of the learning within a setting that is primarily education, community or workplace? Does the learning take place in the context of: fixed or open time frames; is there specified curriculum, objectives, certification; etc.
- Purposes. Is the learning secondary to other prime purposes, or the main purpose of itself? Whose purposes are dominant – the learner's, or others'?
- Content. This covers issues about the nature of what is being learned. Is this the acquisition of established expert knowledge/understanding/practices, or the development of something new? Is the focus on propositional knowledge or situated practice? Is the focus on high status knowledge or not?"

In reality the debate seems overly academic and driven by dominant discourses in education and training policy. The distinctions between formal and non formal learning seem more often driven by finding regime requirements than by the nature of the learning itself. However there is a very big political interest in informal learning. If informal learning could be systematised it could be a cost effective route to increasing training. However in order to do this it is felt necessary to be able to measure the learning taken place - in other words to formalise that learning. As such, the concern is to develop an exchange value to learning, which at present is seen only as having use value. That is not to say that exchange values are only in the interests of employers and policy makers. In an insecure labour market exchange values are important for workers. However present proposals and mechanisms to establishing exchange value are based on identifying equivalents within frameworks linking informal learning to formally acquired qualifications seem more likely to constrain rather than advantage the use and status of infor-

mal learning. A better approach might be to recognise the use value of informal learning through profiling learning in non-constrained (e)-portfolios. Such an approach would provide a major move to leaner driven learning where all learning is valid rather than only recognising that learning supported by qualification frameworks (Attwell, 2005).

There is a major issue in distinguishing between information seeking and learning. Assessment or testing has traditionally been seen as a means of assuring that learning has taken place. How effective assessment is as a measurement of learning may be contested. It may be more fruitful to examine the nature of activities resulting from informal learning as a means of validation. Activities identified through he project case studies were:

a) Purposeful
b) Heavily influenced by context
c) Often resulted in changes in behaviour
d) Were sequenced in terms of developing a personal knowledge base
e) Problem driven or driven by personal interest
f) Social – in that they often involved recourse to shared community knowledge bases through the internet and / or shared with others in the workplace

Such criteria clearly differentiate learning from the acquisition of information.

The issue of structuring of learning experiences is a major issue. In much of the literature, structure is seen as externally defined in the form of curricula or teaching programme. In the case studies we undertook, the learners were structuring their own learning.

There is a question as to how learners are able to incorporate learning within personal knowledge frameworks or structures. Because learning is motivated by problem solving or personal interest it is far more closely related to practice than the education acquired through formal courses and is often episodic. The immediate context of applying the learning may be an aid to incorporating and scaffolding new learning within a personal knowledge schema. On the other hand the learning acquired is not sequenced in the same way as learning acquired from formal education and training.

Much of the most interesting research in this area has been in the field of organisational learning, in attempts to explain how personal knowledge and skills become shared in communities of practice or within organisations and how new knowledge is developed. But even this work is not without its limitations. There has been widespread acceptance of the division between tacit and explicit knowledge with tacit knowledge defined as "knowledge we do not know we have" (Polyani, 1962). Nonaku and Konno (1998)have described a knowledge development cycle, showing how tacit or implicit knowledge is made explicit as part of a process of organisational learning. These ideas have been further developed by John Seely Brown (2002), Per Erik Ellstrom (1997) and others. Other researchers have pointed to how work process knowledge is developed in communities of practice through application in the workplace (Fischer, 1996; Boreham, 2002). This work is useful

in that it moves away from formally acquired and sequenced learning and towards understanding that there are different types of knowledge and that knowledge can be developed in different contexts. However to fully understand the uses of ICT for informal learning in SMEs we need more detailed understandings of the different type of knowledge being acquired and developed.

Forms of knowledge

Jenny Hughes has produced an analysis of different forms of knowledge based on the Welsh language. Whilst English has few words to differentiate knowledge, in Welsh there are at least six different terms for knowledge processes and six different terms for different types of knowledge, each with their own distinct meaning.

The general word for knowledge in Welsh – the translation from the English word knowledge is Gwybodaeth. Even this is not an exact translation. Gwybodaeth means something like 'knowing-ness', rather than knowledge.

However, the word Gwybodaeth – or knowing-ness comes in different forms defining different types of knowledge.

The first six words would appear to relate to knowledge processes. They can, in turn be divided in two – the first three possibly dealing with Knowledge 'absorption' and the following three referring to knowledge generation:

1. *Cynnull* (gwybodaeth) – to gather knowledge (as in acquisition) 'along life's way'
2. *Cynhaeaf* (gwybodaeth) – to harvest (purposefully) knowledge– or set up systems for harnessing knowledge or organise knowledge
3. *Cymrodedd* (gwybodaeth) - to compromise what you know to accommodate the unknown
4. *Cynnau* (gwybodaeth) - to light or kindle knowledge (in someone else) – can also be used to 'share knowledge' but implicit is that it is an active process not simply an exchange of information, which is an entirely different concept.
5. *Cynllunplas* (gwybodaeth) - to design (new) knowledge, paradigm shift
6. *Cynyddu* (gwybodaeth) - to increase or grow (existing) knowledge

The second six terms deal with different types of knowledge. The first three are arguably internal and the second three external.

1. (Gwybodaeth) *cynhenid* - original, congenital knowledge
2. (Gwybodaeth) *cynhwynol* - innate knowledge (collective)
3. (Gwybodaeth) *cymrodeddol* - compromised knowledge – knowledge adjusted to cope with the unexpected or unknown
4. (Gwybodaeth) *cymdeithasol* - sociable knowledge – not 'social skills' but knowledge about the social context in which the knowledge is used and the appropriate way of using it
5. (Gwybodaeth) *cynefin* - shared and passed on knowledge – implies usual, accustomed knowledge
6. (Gwybodaeth) *Cynddelw* - archetype /model / exemplary knowledge

These distinctions are very important and could prove extremely powerful in

analysing non formal learning and knowledge development processes in Small and Medium Enterprise. For instance both "Cynnull (gwybodaeth) – to gather knowledge (as in acquisition) along life's way" and "Cynhaeaf (gwybodaeth) – to harvest (purposefully) knowledge – or set up systems for harnessing knowledge or organise knowledge" take place in SMEs. But there is a very different quality to the different processes and the implications in terms of learning are quite distinct. In a similar vein the idea of "Cynnau (gwybodaeth) - to light or kindle knowledge as an active process" as opposed to passing on information is a very useful distinction.

Most valuable of all may be the distinction between "Cynyddu (gwybodaeth) - to increase or grow (existing) knowledge and Cymrodedd (gwybodaeth) - to compromise what you know to accommodate the unknown". A quick hypothesis would suggest that much of formal learning is "Cynyddu" – increasing and building on existing knowledge. Much of the informal learning using ICT falls in the definition of 'Cymrodedd (gwybodaeth) - to compromise what you know to accommodate the unknown'. This may be why informal learning using ICT can be so powerful.

The idea of "(Gwybodaeth) cymdeithasol - sociable knowledge – not social skills but knowledge about the social context in which the knowledge is used and the appropriate way of using it" - is a way of explaining the social contexts to which knowledge is used in SMEs.

Pedagogic approaches – how are people using ICT to learn?

Pedagogy is usually taken to be the process of teaching or disseminating and facilitating knowledge development. This is a problem in the context of this paper, in that teachers and trainers were not present in any of the learning observed in the case studies. However, it is important to understand how people are learning through ICT, regardless of the lack of mediation through a teacher. There is of course a tradition of research in auto-didactic learning. Even this research tends to assume an external structuring of learning, through some form of guidance or through sequenced learning materials. The issue of sequencing learning and learning materials has been a major concern to e-learning researchers and developers. The project research suggests learners are primarily driven by the nature of the problem in how they sequence their learning. However, this begs the question of how that learning is structured and how the problem is approached.

The use of the Google search engine as the major tool for learning is interesting in this context. It raises the question of how people are framing their search terms, how they are refining search strings, how they are selecting from the results of search queries and how they are following hyperlinked texts. For a search result to be useful it needs to both produce materials, ideas and concepts which can connect with the learner's existing knowledge base of the one hand and approach the issue or problem being addressed on the other. The ideas of legitimate peripheral participation and proximinal development may be helpful

for explaining this process and of understanding how people are making sense of knowledge.

Lave and Wenger propose that the initial participation in a culture of practice can be observation from the periphery or legitimate peripheral participation. The participant moves from the role of observer, as learning and observation in the culture increase, to a fully functioning member. The progressive movement towards full participation enables the learner to piece together the culture of the group and establish their identity.

> *"Knowing is inherent in the growth and transformation of identities and it is located in relations among practitioners, their practice, the artefacts of that practice, and the social organisation … of communities of practice."(Lave and Wenger, 1991, p 122).*

Especially in micro enterprises, SME employees have tended to be isolated from communities of practice. This may be a greater barrier to learning than the much fabled lack of time to attend training courses, One of the most powerful uses of ICT for learning in SMEs is the ability to connect to distributed communities of practice. There has been much comment on the phenomenon of 'lurkers' on discussion sites, lists servers and bulletin board. Lurking is very much a process of legitimate peripheral participation. Watching, listening and trying to make sense of a series of posts and discussions without being forced to reveal oneself or to actively participate allows the development of knowledge 'about knowledge' within a community and about the practices of the on-line community.

Similar to the idea of legitimate peripheral participation is Vygotsky's (1962) "Zone of Proximinal Development". This theoretical construct states that learning occurs best when an expert guides a novice from the novice's current level of knowledge to the expert's level of knowledge. Bridging the zone of proximinal development construct with legitimate peripheral participation construct may be accomplished if one thinks of a zone in which the expert or mentor takes the learner from the peripheral status of knowing to a deeper status. This may be accomplished with or without intention as Lave and Wegner (1991) state:

> *"Legitimate peripheral participation is not itself an educational form, much less a pedagogical strategy or a teaching technique. It is an analytic viewpoint on learning, a way of understanding learning. We hope to make it clear that learning through legitimate peripheral participation takes place no matter which educational form provides a context for learning, or whether there is any intentional educational form at all. Indeed, this viewpoint makes a fundamental distinction between learning and intentional instruction (*Lave and Wegner *1991, p. 40)."*

However the expert scaffolds the environment to the extent in which the learner is engaged with the discourse and participants within the zone and is drawn from a peripheral status to a more engaged status. The peripheral learner interacts with the mentor, expert learners and peers within this zone. More able learners (peers) or the mentor will work with the less able learner potentially allowing for socially constructed knowledge.

Within the SMEs studies there were few instances of mentoring or continuous contact with an expert. The use of ICT was allowing distributed access to expertise – albeit mediated through bulletin boards, forums and web pages. This leaves open the question as to the process of scaffolding, which essentially becomes an internalised process. However the process of less able learners working with more able peers is a common process in seeking new knowledge through the use of ICT.

Essentially workers are using search engines to seek out potential forums and contexts for learning. Selection depends on closeness of interest and the level of discourse in the community. There is little point in following a discourse of too low a level, of knowledge already gained, neither is their an attraction to a discourse clearly on an level which cannot be understood. Learners will seek a community with knowledge at a higher level than their own but which can connect with their prior learning, learning and practice. Typically they will lurk in order to understand the workings of the community and to gain some basic knowledge. After a period of time they might contribute in the form of a question and later again might themselves contribute to the hared knowledge pool. In this ways they move from the periphery through lurking to full bound participants in a community. It should be noted that communities are frequently overlapping and that the use of hyperlinks and more recently standards like trackback allow the communities to be dynamic with the emergence of new groups and discourses.

Education and Training Systems and the Organisation of Work

Informal learning and education and training frameworks

That much learning is taking place in the workplace totally outside the formal education and training system has considerable implications. Although informal, work based learning is not new, the use of ICT is resulting in an increase in the frequency and volume of such learning. Furthermore, employers and workers are increasingly and unconsciously seeing informal learning as an alternative to traditional education and training courses.

It is especially noticeable that in few, if any, of the enterprises we studied were individuals seeking formal recognition of new competencies and skills. This may be because they were not aware of any opportunities for such recognition or assumed (possibly correctly) that to gain recognition they would have to attend a formal course. It may also be that a similar study in a different country, or a country with a different education and labour market system, would find different results. In Wales there is very weak linkage between formal qualifications and employment. Some employers said they did not even ask about formal qualifications when interviewing job applicants. Experience and reputation were seen as much more important. The only real interest in formal qualifications was if required for legislative reasons.

To some extent the European Union is attempting to address this question through the European Qualification Framework (EQF). The EQF is competence based, rather than course driven and the EU is attempting to develop systems and processes for the accreditation of informal learning. However, the EQF is seriously flawed in that it is based on education achievement, goals and structures, rather than focusing on work based learning and knowledge. It is difficult to envisage how the learning, skills and knowledge being acquired in the SMEs we studies could easily be assessed within an educational framework.

A further finding of the research is that there was little correlation between employees' previous qualifications and their present employment. To some extent this is unsurprising given the weak labour market – education and training linkages in Wales. Nevertheless, it does have implications for the education systems. Problem solving (and framing), information literacy, communication and the ability to "learn to learn" are all central to the learning processes was observed in our case studies. These are variously known as key or core skills or key qualifications in the literature. It would appear that these skills or competencies are acquired through previous learning, but that the subject of that learning is not critical. It would be very interesting to know whether vocational training or university courses best developed such skills and competencies (or whether there is no difference). Sadly, the case studies are insufficient to provide any useful evidence of this. The findings would suggest that participation in further education and training is important in developing skills and knowledge but that the subject or occupational focus is of far less importance.

Work Organisation and the use of ICT for learning in SMEs

It would be wrong to pretend that ICT was being used for learning – formal or informal – in all the case studies undertaken. In some there was little evidence that any form of learning was taking place in the enterprise! In a previous publication (Attwell, 2003), it was suggested the attitude of managers was perhaps the most important factor in influencing, positively or otherwise, the incidence of the use of ICT for learning in SMEs. As a result of the case studies this hypothesis can be refined.

Few of the managers interviewed had taken any positive steps towards encouraging employees to learn using ICT. However there were major differences in work organisation and the freedom of employees to control their own work and the responsibility of employees for that work. Some enterprises had a strictly hierarchical form of work organisation, with all major decisions being taken by senior managers, whilst in others decision making was largely devolved, with a more co-operative type of structure. These differences in work organisation were largely, but not solely, determined by the management and were perhaps the most important factor in determining the use of ICT for learning. Putting it simply, if employees are not allowed to access the internet or do not have access to computers, this is little likelihood of ICT based learning, formal or otherwise. The

following list proposes some of the reasons for the very different forms of work organisation we observed:

- Differences in personality and management style. Different owners had very different approaches to management. It is interested that few had formal qualifications in management, although most were involved in some form of network with other SME managers, formal or otherwise.
- Nature of the company. There is some evidence to suggest that manufacturing companies – or enterprises with production lines, tended towards more hierarchical management. However this was not so in every case, with some studies involving hierarchically organised service industries, and other manufacturing enterprises with flat management structures.
- Size of the enterprise. Smaller companies tended towards being less hierarchical although once more this was not so in every case.
- Relationships with employees. In some companies – especially the smaller enterprises, employees were personal friends of the managers or lived in the same communities. In these cases, management tended to be less hierarchical with greater trust relationships between management and employees.
- Qualifications and skills of employees. There was a correlation between those enterprises with more highly qualified employees and less hierarchical management structures. To some extent this was related to the nature of the company and to occupational skill and knowledge requirements to undertake the work.
- Stability of the enterprise. Those enterprises with a longer standing and more stability tended towards less hierarchical management structures. Many employees had been working in these enterprises for a long period, had a greater holistic knowledge of the company and of the company's requirements and tended to take more responsibility for organisational development.
- Ambition of the manager. Some enterprise owners were seeking to expand or diversify, out of need to survive or from ambition to grow, whilst others were quite content to continue at the present size. In general, where managers were content with the present size of the enterprises, they tended to leave more responsibility to the employees to manage the organisation.

That more learning takes place in less hierarchical organisation is not surprising and is one of the key ideas from proponents of the learning organisation. Barry Nyhan (Nyhan et al, 2003) states

> *"One of the keys to promoting learning organisations is to organise work in such a way that it is promotes human development. In other words it is about building workplace environments in which people are motivated to think for themselves so that through their everyday work experiences, they develop new competences and gain new understanding and insights. Thus, people are learning from their work – they are learning as they work."*

He goes on to say:

> *"This entails building organisations in which people have what can be termed 'developmental work tasks'. These are challenging tasks that 'compel' people to stretch*

their potential and muster up new resources to manage demanding situations. In carrying out 'developmental work tasks' people are 'developing themselves' and are thus engaged in what can be termed 'developmental learning'."

There are concerns over the 'learning organisation' research and tradition. One is that it was largely an aspiration in that companies declared themselves a learning organisation without any real meaning or effectual changes in management or work organisation. The second was that it assumed an unproblematic confluence of interest between employees and employers. Some organisations appeared to be adopting the banner of the learning organisation as a pretext for speeding up production and for shifting responsibility for achieving organisational goals to employees, regardless of whether this was in their own interests and whether it improved or worsened working conditions. There is far less buzz around the idea of the learning organisation today although it is unclear whether this is due to passing management theory fads or whether in the harsher economic climate any pretence of joint interest between employees and employers is being dropped.

This debate is important to the use of ICT for learning in SMEs. One of the major concerns raised at a series of European Commission seminars on e-learning in SMEs was the potential conflict of interest between employers and employees. Employers were seen as interested in lifelong learning for employees as long as it was in their own time. Employees were seen as interested in gaining further qualifications for gaining extra bargaining power or for obtaining alternative employment.

Although some managers interviewed were concerned that additional qualifications could lead to the loss of staff from their enterprise, there was little evidence of a conflict in the case studies. Managers and employees appeared to see the use of ICT, not as for learning, but as an everyday and normal part of the work process at least in those enterprises where the most informal learning was taking place. There were managerial concerns over the misuse of the internet, but this was seen as an issue to overcome, rather than as a reason to prevent internet access.

In the case studies undertaken the greatest incidence of ICT based learning tended to take place in enterprises:

- Where employees had greatest freedom in the organisation of their work
- Where employees had the greatest opportunities for proposing and implementing changes in the way work was organised
- Where the nature and technologies being used were changing fastest
- Where ICT was most involved in the work process
- Where employees had most responsibility for the outcomes of their work
- Where team work was most important
- Where employees were integrated in communities of practice
- Where employees had opportunities to develop their own occupational profiles
- With networks with other enterprises
- Where ICT was used for Business to Business (B2B) processes

– Which were involved in e-commerce

From this it could be suggested that as B2B and e-commerce becomes more important – and it was notable that most enterprise were actively considering further developments in this direction - the use of computers and ICT for informal learning will increase. If the form of work organisation is so important for informal learning, it should be possible to develop and design the workplace and work organisation in such a way as to maximise the potential of ICT based learning.

A report by the US National Science Foundation looking at informal learning in the workplace found that job competence of sales engineers demonstrated a statistically significant positive correlation with customer satisfaction. Informal learning methods demonstrated a statistically positive correlation with job competence. Informal learning methods included a well organized 'communities of practice' programme supported by extensive, expert knowledge capture and retrieval processes and technologies.

Such a "communities of practice" programme could be introduced as part of a programme of encouraging the uptake and use of ICT by SMEs, alongside enhanced opportunities for networked knowledge capture and retrieval processes and technologies.

De Corte (1990) suggested, "a powerful teaching and learning environment occurs where:

– it is based on the provision of direct experience rather than indirect experience and use of representational systems
– it is based on learning through action in the contexts in which the learning is to be applied
– learning takes place in the presence of experts practising in the contexts in which the learning is to be applied
– experiences challenge the learner
– individuals become conscious of their implicit theories about learning
– individuals view learning as under their control and as intrinsically rewarding
– learners become conscious of their thinking and learning strategies
– there are the conditions of collaborative teamwork which provide experience for the learner in the form of modelling, feedback and encouragement to reflect
– facilitators of learning such as mentor or coach themselves engage in learning to learn, facing problems, adapting to these in the practical context and reflecting on problem formulation and problem solving strategies
– learners gain conscious cognition of unconscious learning through strategies such as meditation, spontaneity, reflection, intuition, imagination and fantasy (Murphy, 1975)."

Although there were no facilitators of learning in the SMEs studied, many SMEs provide rich potential for meeting De Corte's other criteria. Hover, for this to take place SMEs require consultancy and help in designing the learning environment.

Informal Learning, ICT Based Learning and Occupational Profiles

The developing use of ICT for non formal learning in SMEs has implications for the future development and use of occupational profiles.

In most countries in Europe, occupational profiles are determined centrally through different processes but usually involving employer representatives, trade unions and other workers organisations and education and training specialists. Occupational profiles are important in that they determine, to a greater or lesser extent, labour market structures, collective pay bargaining and education and training curricula.

Obviously occupational profiles change overtime with changes in production, the adoption of new technologies and changing work organisation. New occupational profiles emerge such as mechatronics, which has brought together competences and skills from mechanical and electronic engineering. Some occupational profiles decline or even totally disappear. There is evidence to suggest that occupational profiles are changing more quickly than before, probably due to the speed of ongoing technology development and implementation.

To some extent, the degree to which occupational profiles are represented within SMEs depends on the degree of regulation. However, many SMEs may look for broader occupational profiles than in larger enterprises. With less staff, the degree of specialisation possible is more limited.

The case studies undertaken suggested that where the use of ICT for informal learning is common, employees were tending to develop their own occupational profiles, based both on the needs of the enterprise and on their own specialities and interests. Furthermore, occupational profiles are developing in a more dynamic way than might previously have been possible. Thus, instead of occupational profiles being determined centrally and themselves defining the curriculum for a given occupation, learning is beginning to drive the development of occupational profiles.

Researchers in Germany (Rauner and Heidegger, 1997) have drawn attention to the need to re-examine the relationship between technology, education and work organisation. They have proposed the idea of wandering and dynamic occupational profiles. Heidegger and Rauner proposed reducing the number of occupational profiles in Germany from the present total of nearly 400 to about 100 "occupational core profiles". "The graduates of these new apprenticeships should be able, relying on their own shaping abilities, to actively 'shape' their career pathways ('biographical competence') while, at the same time, being in the position to meet new requirements on the labour market." (Attwell and Heidegger, 2001).

Attwell and Heidegger were concerned that the introduction of new technologies were leading to technocentric development, with workers given little or no opportunity to determine their own skills and knowledge. The case studies would suggest that the use of the same technology for learning is conversely providing an opportunity for workers to shape their own occupational profiles.

Digital Literacy

Over the last decade there has been a considerable effort in most European countries to develop basic computer literacy within the workforce, through courses like the European Computer Driving License (ECDL). We found little evidence of a problem with basic computer literacy. However, there is an issue of how the more advanced information literacy we described above is acquired and developed. The EC funded Socrates I-Curriculum project distinguished between transformational, integrating and operational skills and knowledge, and put forward the following table with categories and examples of criteria from each as a stage towards the development of a framework for digital skills (I-Curriculum, 2003).

	Transformational	**Integrating**	**Operational**
Exchanging and sharing information AND Communication and collaboration	Make metrics to evaluate the benefits of an (ICT) activity To work within a community of practice on knowledge-rich tasks	To recognise and infer information from different formats To know the style for communicating effectively	To know the terms used To understand the basics of computers
Researching: Finding things out	Design or evaluate systems that are commensurate, valid, communicative, authentic, reliable, legible and plausible, explicitly consider the limitations and constraints	To recognise the appropriate level of detail for task To recognise the need to analyse these data sources, e.g., is it reliable?	To use spreadsheets, word processing tools, databases – add elements, format, checking procedures etc.
Developing ideas and making things happen	Evaluate the assumptions and values embodied in particular models and modelling systems	Be able to relate the results to the instructions and outcomes	To be able to read the values given by the technology
Working practices and attitudes	To analyse societal and individual consequences of the use of ICT in economic/political/cultural terms and how information affects opinion	To be aware of questions of equity in access to, and use of, ICT	To know risks and advantages of using technology and how to act prudently

According to the I-Curriculum project research, much of what is presently being taught as basic skills in information and communication technology is operational. They see a need to extend these skills to include those in the integrating and operational column.

The I-Curriculum framework is intended to be integrated within existing subject-based education and training, rather than as a stand-alone curriculum. Although, needing more refinement, the Framework matches the kind of skills for learning, which we observed in our case studies.

There is recognition of the need for new basic skills or digital literacy as a result of the far ranging impact of ICT within society. However present basic skills provision is limited, focusing on the operational skills of how to use technology and failing to develop the critical thinking skills important needed to make judgements and the creative skills for constructive and critical application of ICT. A wider understanding of digital literacy is needed to allow the social shaping of technology, rather than mere passive consumption. Such a concept would not only advance a wider vision of citizenship and participation would enhance the abilities to use ICT for learning in the ways shown in the study of learning in SMEs

Developing Policies to Support Learning in SMEs

Deriving policy recommendations form empirical studies is not a simple undertaking, nevertheless, we believe the findings of the study do have very direct implications for future policy in this area. It must also be noted that present policies have made very little impact ion boosting the volume of training. In order to assess what policies might be effective it is worth reviewing again the main findings of the project with regard to learning in SMEs:

- Learning takes place in response to problems or issues or is driven by the interests of the learner
- Learning is sequenced by the learner
- Learning is episodic
- Learning is controlled by the learner in terms of pace and time
- Learning is heavily contextual in terms of time, place and use
- Learning is cross disciplinary or cross subject
- Learning is interactive with practice
- Learning builds on often idiosyncratic and personal knowledge bases
- Learning takes place in communities of practice

There has been an upsurge of interest in informal learning in the recent period. However, as was stated earlier this has mainly focused on establishing equivalency with formal qualifications and it has proved difficult to establish tools and mechanisms for accrediting informal learning. A more productive course may be to recognise that learning takes place in multiple contexts and from multiple sources. Although the study showed the use of computers for informal learning in the workplace it also revealed the importance of previous formal learning for the

development and scaffolding of knowledge. Workers in SMEs had also gained new skills and knowledge form non formal learning contexts including evening classes attended outside work time and driven largely by self interest. The provision of portfolios - as an extension of the Europass CV - could be an important form for recognised in the different contexts for learning. e-Portfolios are fast being introduced in schools and universities but had made limited headway for vocational or work-based learning. If e-portfolios were to be of more widespread relevance it is important that they recognise the importance of communities of practice and that they record all learning including informal learning. Present e-Portfolio applications tend to be constrained by the requirements of formal qualifications. The development and use of e-portfolios would require some considerable support. It is naive to expect workers to adopt and develop e-Portfolios without mentoring and guidance of some form.

Perhaps the most important finding of the research is that most learning in SMEs takes place not through engagement in forma learning programmes but through communities of practice. We suspect this is nothing new - the use of ICT has enabled the development of dispersed communities of practice. This is particularly important for SMEs where there may be few opportunities for face to face engagement with colleagues engaged in similar practices and with similar problems. From a policy point of view this also poses some issues. It is easy to propose that policies should be focused on supporting the development of communities if practice but this begs the question of how. It is notable that there are very different business structures in the Member States of the European Union. In particular Chambers of Commerce and Trade Associations play very different roles. In some countries they are regulatory bodies and membership is compulsory. In other countries such as the UK, they act more as social organisations, and many SMEs are not members. Similarly there are very big differences between industry sectors. In some industries there are close contact between SMEs, in other industries far less contacts. Clusters of SMEs collaborate on regional basis in some sectors; other SMEs may be part of national or international supply chains. The development of incubator units has been important in Wales as a source of networking and informal learning. Suppliers of machinery and technology may be an important source of information. One-size policies will not fit all. A policy of encouraging and supporting the development of communities of practice and engagement in those communities will need to be implemented on a sector by sector and region by region basis. This tends to imply that within such a broad policy decisions over funding and support need to be taken as close to practice as possible and that such policy implementation needs to be enabling rather than restrictive.

The finding that previous involvement in formal learning is important for future engagement in informal learning if not surprising is still important. Consideration could be given to extending the role of formal learning providers to supporting informal learning. Although this probably lies outside the remit and

experience of the higher education sector those responsible for initial vocational training and especially apprenticeship providers do have the involvement with practice necessary for developing and supporting communities of practice. Although in some countries initial vocational training providers do have a role in providing continuing training this is primarily in the context of formal course provision. Widening that role to supporting informal learning through supporting distributed communities if practice, possibly on a regional basis could be a significant advance.

In many countries occupational profiles are formally stipulated by regulatory bodies, often involving social partners. Occupational profiles historically arose out of the craft trades and tended to be narrowly defined. The development of broader occupational profiles could be of importance in providing the initial knowledge base for future informal learning, even if that broader based learning was not required for immediate employment purposes.

Similarly a broader understanding of digital literacy and its integration within the curriculum at all levels is important in allowing workers to use ICT for learning in the workplace.

Supporting informal learning should not be seen as in opposition to formal training. Within a lifelong learning scenario it is likely that workers will engage in periods of formal training and periods when most learning will be informal and work based. Supporting informal learning through communities of practice may well result in an increased awareness of the importance of learning for SMEs and hence to increased involvement in formal training.

Few policy makers interviewed in the ICT and SME project were of the opinion that subsidies would be of any great benefit. Certainly the experience of the UK individual learning accounts where workers were offered a lump sum payment for learning courses was not a success. Nevertheless, the cost of training is clearly a perceived barrier by SME managers. Ensuring free access to learning through communities of practice, linked to subsidised more formal learning provision might be important in developing a wider take up for ICT based learning opportunities.

The area of business services and support or SMEs is an area of some interest. Once more generalisations for all of Europe are problematic. However, all countries provide support in some form or other to the establishment of SMEs and this is an extremely active area for EU policy and intervention. In many countries education and training is a separate policy area. It would appear that often, different agencies are responsible for providing business support and consultancy for SMEs, and advice and development for education and training. A closer linkage between these policy areas could be of value especially of this is connected to an awareness of the importance of informal learning. Many agencies provide support to SMEs in developing innovation and in work organisation, in networking and in marketing. In most countries there is also support or SMEs in implementing new technologies in the workplace. An awareness of the use of ICT to support

informal learning and of the importance of work organisation for the development of informal learning could allow the provision of a more integrated support services for SMEs within which learning plays a key component.

Finally a review of policies for developing e-learning provision for SMEs is overdue. Present models have focused on the extension of the largely consumer driven model of developing standardised learning materials and component qualifications to be delivered through a Learning management System or Virtual Learning Environment and of targeted marketing campaigns towards SMEs. This model is not only costly but has made little impact and is unsustainable. If learning is best developed through communities of practice then the focus for programmes and projects seeking to provide e-learning for SMEs should be refocused on the provision of applications and support for distributed communities of practice for SMEs.

In terms of software applications this could involve the increased use of social software rather than more traditional e-learning programmes and applications. Social software lets people rendezvous, connect or collaborate by use of a computer network and is based on the idea of distributed networks of people, content and services that are adaptable and responsive to changing needs and goals. Social Software adapts to its environment, instead of requiring its environment to adapt to software. Applications include web logs, wikis and photograph sharing services. This form of software is ideally suited to supporting communities of practice in SMEs. Rather than subsidise the development of professional learning materials the emphasis could be on the sharing of peer group learning materials through networks. Aggregator applications allow advanced searching and the bringing together of materials from different sources. The refocusing of programmes and projects in this way allow the vision of ecologies of learning materials, rather than the present unsustainable pilot applications. There are a number of interesting developments in personal learning environments based on social software. These could potentially be adapted to build on the informal learning, which already takes place and at the same time allow the natural development of e-learning portfolios based on practice.

References

Admiraal, W., Heijting st , B., Laat, M. de, & Rubens, W. (2003): E-learning in het midden- en kleinbedrijf (MKB). HRD Thema, 4(3), 79-86.

Admiraal, W., Laat, M. de, Rubens, W., & Lally, V. (2003): ICT support for workplace learning: eLearning in Small and Medium sized Enterprises (SMEs). Paper presented on the Annual European Conference on Educational Research (ECER), September 17-20, Hamburg (Germany).

Agyris, C. and Schön, D., (1978): Organizational Learning: A theory of action perspective, Reading, Mass: Addison Wesley, 1978.

Arbaugh, J. B. (2000): Virtual classroom characteristics and student satisfaction with Internet-based MBA courses. Journal of Management Education, 24, 32 – 54.

Attwell, G. (2003): The challenge of e-learning in small enterprises: issues for policy and practice in Europe. Report from Cedefop Panorama Series. Luxembourg: Office for official publications of the European communities.

Attwell G, (2005): Recognising learning: educational and pedagogic issues in e-Portfolios, paper presnetd at ePortfolio 2005 26 - 28 October 2005, Cambridge UK http://www.eifel.org/portfolio/ep2005/eP2005presentations/PS2B_attwell_barrett.ppt, accessed 31 December 2005

Attwell G. and Heidegger G. (2002): The social shaping of work, technology and organisations as a guiding principle for vocational education and training, in Transformation of Learning in education and training, CEDEFOP: Luxembourg

Back, A. (2003): Workplace Learning: mit E-Learning im Arbeitsprozess lernen. In: SKO-Leader, 6, 2003, 8-9. - Download: http://verdi.unisg.ch/org/iwi/iwi_pub.nsf/wwwPublRecentGer/B0AF72855AF5E734C1256E32003D7F78. 30.10.2005.

Bellinger, A. & Krieger, D. (2004): Bei KMU harzt das elektronische Lernen. In: Dossier E-Learning, 25.03.2004. - Download: http://212.98.53.238/domino/CWArchiv.nsf. 20.10.2004.

Benson, S. (2003): Building more effective virtual teams: an examination of the task variable in online group problem-solving, in International Journal on E-Learning, October, 2003

Billett, S. (2001a): 'Coparticipation: affordance and engagement at work', New Directions for Adult and Continuing Education 92:63-72.

Billett, S. (2001b): 'Learning throughout working life: interdependencies at work', Studies in Continuing Education 23:19-35.

Billett, S. (2004): Workplace participatory practices. Conceptualising workplaces as learning

Bjornavold, J. & Colardyn, D. (2004): Validation of Formal, Non-Formal and Informal Learning: policy and practices in EU Member States. European Journal of Education,Vol. 39, No. 1, 2004.

Black, P. (2003): A successful intervention – why did it work? Paper presented at the Annual convention of the American Educational Research Association, Chicago

Boreham, N.; Samurcay, R.; Fischer, M. (2002): Work process knowledge. London: Routledge

Brown, J.S., Collins, A., and Duguid, P. (1989): Situated cognition and the culture of learning. Educational Researcher, Jan-Feb, 32-42.

Carstens, R. W., and Worsfold, V. L. (2000): Epilogue: A cautionary note about online classrooms. In R. E. Weiss, D. S. Knowlton, and B.W. Speck (Eds.) Principles of Effective Teaching in the Online Classroom, No. 84 (83-87). San Francisco: Jossey-Bass.

CBS (2005): Meer volwassenen doen cursus of opleiding (More adults attend course or education). Retrieved on 3 October 2005: http://www.cbs.nl/nl-NL/menu/themas/mens-maatschappij/onderwijs/publicaties/artikelen/2005-1754-wm.htm

CEDEFOP (2001): E-learning and training in Europe: a survey into the use of e-learning in training and professional development in the European Union. Luxembourg: Office for Official Publications of the European Communities (CEDEFOP)

Cedefop. (2002): Joint Cedefop-European Commission study on elearning in SMEs. Brussel: CiRN

Colardyn, D. and Bjornavold, J (2004): Validation of Formal, Non-Formal and Informal Learning: policy and practices in EU Member States, European Journal of Education 39 (1), 69–89 2004 p.115

Collective Labour Agreement. Retrieved on 20 October 2005: http://international-ezaken.szw.nl/index.cfm?fuseaction=dsp_document&link_id=35416&doc_id_sub=5887#3125200

Colley H, Hodkinson P and Malcolm J. (2002): Non-formal learning: mapping the conceptual terrain. A Consultation Report, Leeds: University of Leeds Lifelong Learning Institute. Also available in the informal education archives: http://www.infed.org/archives/e-texts/colley_informal_learning.htm.

Commission Memorandum on Life Long Learning (2000): Luxembourg: Office for Official Publications of the European Communities

Coombs, P. and Ahmed, M. (1974): Attacking Rural Poverty, Baltimore: The John Hopkins University Press

Cross, J. (2003): Informal learning - The other 80%. Retrieved on 3 October 2005: http://www.internettime.com/Learning/The%20Other%2080%25.htm

Cross, J. (2006): Informal Learning. Pre-publication findings of a twelve-month research project on informal learning in corporations. Berkely, 2006. Website: http://internettime.breezecentral.com/informl/ 14.1.2006

DeBard, R., & Guidera, S. (2000): Adapting asynchronous communication to meet the seven principles of effective teaching. Journal of Educational Technology Systems, 28(3), 219-230.;

DeCorte, E. (1990): Learning with new information technologies in schools: Perspectives from the psychology of learning and instruction. Journal of Computer Assisted Learning, 6, 69-87

DeCorte et al, eds, (2003): Powerful Learning Environments, Pergamon Press

DER STANDARD: „Breitbandinternet-Offensive für Kleinbetriebe". OnlineStandard: http://www.derstandard.at. 21.10.2004.

Downes, S. (2005): E-learning 2.0. Retrieved on 19 October 2005: http://elearnmag.org/subpage.cfm?section=articles&article=29-1

Easterby-Smith, M., Burgoyne, J. and Araujo, L. (1999): Organizational learning and the learning organization: Development in theory and practice. Sage, London.

EBW - e-business w@tch, European Commission: „The European e-Business Report. A portrait of e-business in 15 sectors of the EU economy." 2003. – Download: http://www.ebusiness-watch.org/marketwatch/resources/E-Business-2003.pdf. 24.10.2004.

EBW - e-business w@tch, European Commission: „The European e-Business Report. A portrait of e-business in 10 sectors of the EU economy." 2005. – Download: http://www.ebusiness-watch.org/resources/documents/eBusiness-Report-2005.pdf. 12.1.2006

ELLSTRÖM, P E (1997): The many meanings of occupational competence and qualifications, In Brown, A (ed.) Promoting Vocational Education and Training: European Perspectives, University of Tampere Press, Tampere

Ellström, P-E. (1996): Arbete och lärande: Förutsättningar och hinder för lärande i dagligt arbeite, Report from National Institute for Working Life (Arbetslivsinstitutet), Stockholm. Environments. The Journal of workplace learning, 16, 6.

European Commission (2000): Report from the Commission to the Council and the European Parliament (2000) Designing Tomorrow's Education: Promoting Innovation With New Technologies. Brussels, 27/01/2000 COM (2000) 23 final

European Comission (2003): Commission Recommendation concerning the definition of micro, small and medium enterprises. Commission Of The European Communities, Brussels, 06/05/2003 C (2003) 1422 final

Fischer, M.(1996): Acquiring Work Process Knowledge on the Shop-Floor Level. Paper presented at Third Work Process Knowledge Meeting, Bremen, Germany, December 12-14, 1996.

Florén, H. and Tell, J. (2003): "Key learning themes in the small-business literature." Small Enterprise Research, 11, 1.

Fromm, M.: e-learning – ein Fall für KMU?. 2003. – Website: http://www.ecin.de/state-of-the-art/e-learning-fuer-kmu/ 5.1.2006.

Fuller, A. and Unwin, L. (2003): Fostering workplace learning: looking through the lens of apprenticeship. European Educational Research Journal, 2,41-55.

Hahne, K. (2004): „Ansätze informellen und arbeitsorientierten E-Learnings in Handwerk und KMU". 2004. – Website: http://www.bibb.de/de/limpact12321.htm. 20.11.2005.

Hahne, K. (2004): Informelles und formelles E-Learning in der Berufsbildung, Bundesinstitut für Berufsbildung, Bonn, 2004

Heidegger, G., Rauner F. (1997): Vocational Education in Need of Reform, , published by Institut Technik und Bildung

Heidegger, G., Rauner, F. (1997): Reformbedarf in der beruflichen Bildung, Gutachten im Auftrag des Landes Nordrhein-Westfalen, MWTV, Düsseldorf

Howell, S. L., Saba, F., Lindsay, N. K., & Williams, P. B. (2004): Seven strategies for enabling faculty success in distance education. Internet & Higher Education, 7(1), 33-49.;

Hutchins, E. (1995): Cognition in the Wild, MIT Press.

I-Curriculum (2003): http://promitheas.iacm.forth.gr/i-curriculum/Assets/Docs/Outputs/UK%20summary%20EN.pdf, accessed 22 October 2004

Katzeff, C. and Abdallah, L. (2003): "ICT-based learning in knowledge intense micro-sized enterprises". In Proceedings for 2nd International Conference on Multimedia ICT's in Education (m-ICTE 2003), December 2003, Badajoz, Spain.

Khan, B.H. (1997): Web-Based Instruction, Educational Technology Publications, Englewood Cliffs, New Jersey.;

Lave J. and Wenger E. (1991): Situated Learning - Legitimate Peripheral Participation, Cambridge University Press,

Ley, T. (2004): Integrating Knowledge Management and e-learning. A competency perspective. Presentation held at the I-Know 04 conference workshop on „Digital Content Engineering: Definition and Roadmap". Salzburg.

Lockyer, L., Harper, B. & Patterson, J. (1999): Health Education in a Web-based Learning Environment: Learners' Perceptions. Proceedings of ED-MEDIA99 World Conference on Educational Multimedia, Hypermedia and Telecommunications. (vol. 1, pp 56-61). Charlottesville, VA: Association for the Advancement of Computing in Education.

Masie, E. (1999): Supply Chain Learning - Training Customers & Suppliers! Retrieved on 3 October 2005: http://www.masie.com/masie/default.cfm?trends=155&page=trendsdisplay

Massy, J. (2002): Quality and e-Learning in European Training, Twyford: Bizmedia

McGorry, S. Y. (2003): Measuring quality in online programs. The Internet and Higher Education, 6(2), 159 – 177.

Michel, L.P. (2004): „Status quo und Zukunftsperspektiven von E-Learning in Deutschland". Institut für Medien und Kompetenzforschung (Hrsg.). Essen, 2004. - Download: http://www.mmb-michel.de/Bericht_NMB_Expertise_Endfassung_20040906.pdf. 20.10.2004.

MMB - Institut für Medien- und Kompetenzforschung: „e-learning Anwendungspotenziale bei Beschäftigten": Ergebnisbericht zur Studie. 2004. – Download: http://www.mmb-michel.de/nordmedia_bericht.pdf. 16.11.2005.

Morgan Motor Company http://www.morgan-motor.co.uk/

National Business Incubation Association (2005): What is business incubation? Retrieved on 14 June 2005: http://www.nbia.org/resource_center/what_is/index.php

New Zealand Trade & Enterprise (2005): Incubators: more information. Retrieved on 14 June 2005: http://www.nzte.govt.nz/section/11735/11049.aspx

Nonaka, I. and Konno, N. (1998): The Concept of „Ba": Building a Foundation for Knowledge Creation, California Management Review, 40, 3, 40-54.

Nyhan, B et al (2003): Facing up to the learning organisation challenge. Vol. I. Thessaloniki, CEDEFOP,

Piaget, J. (1977): The development of thought: Equilibration of cognitive structures. New York:Viking Press.

Polanyi, M. (1958, 1998): Personal Knowledge. Towards a Post Critical Philosophy

Polyani, M. (1962): Personal knowledge. Chicago: University of Chicago Press

Prusak, L. (1997): Knowledge in Organizations, Butterworth-Heinemann, USA

Reglin, T. (2004): Welche Infrastruktur benötigt e-learning? In: Hahne, K.; Zinke, G. (Ed.), E-Learning: Virtuelle Kompetenzzentren und Online-Communities zur Unterstützung arbeitsplatznahen Lernens. Bielefeld, 2004. pp. 125 – 142 URL: http://www.f-bb.de/fbb/fachartikel/pdfs/infrastruktur-e-learning.pdf 17.11.2005.

Reglin, T. and Hölbling, G. (2003) Kompetenzentwicklung mit Neuen Medien? In: QUEM-Report 80,pp. 9–74. Berlin

Revermann, C. (2004): e-learning. EUROPÄISCHE e-learning-AKTIVITÄTEN: PROGRAMME, PROJEKTE UND AKTEURE. In: Büro für Technikfolgen-Abschätzung beim Deutschen Bundestag (Ed.). Hintergrundpapier Nr. 11. Berlin, 2004. URL: http://www.tab.fzk.de/de/projekt/zusammenfassung/hp11.pdf 28.9.2005.

Robinson, B. (2001): Innovation in Open and Distance Learning: Some lessons from experience and research. In F. Lockwood, and A. Gooley (Eds.) Innovation in Open and Distance Learning: Successful development of online and Web-based learning. (15-26). London: Kogan Page.

Salmon, G. (2000): E-moderating: The key to teaching and learning online, London: Kogan Page.

Saporta, S. (2003): System Requirements for E-Learning. 2003. URL: http://www.midicorp.com/articles.php?section=articles&id=13 14.11.2005.

Scheuermann, F. & Reich, K. (2002): "E-Learning in Austrian SMEs: A Case Study from the Tyrol Region". Innsbruck.

Schlichte Bergen, C. (2004): E-learning: An exploration within small and medium-sized companies. Thesis International Business Studies, Faculty of Economics and Business Administration, Maastricht University, The Netherlands.

Seely Brown, J. (2002): Learning in the Digital Age, Forum Futures, pp. 20-23

Senge, P. (1990): The Fifth Discipline. The art and practice of the learning organization, London: Random House.

Seufert, S. & Mayr, P.: Fachlexikon e-learning. Bonn, 2002.Straka, G.A.: Informal learning: genealogy, concepts, antagonisms and questions. ITB-Forschungsberichte 15. Bremen, 2004.

Speck, B. W. (2000): The Academy, Online Classes, and the Breach in Ethics. In R. E. Weiss, D. S. Knowlton, and B. W. Speck (Eds.) Principles of Effective Teaching in the Online Classroom, No. 84 (73-81). San Francisco: Jossey-Bass.

TMCnet (2005): Largest-Ever Study on Learning Management Systems Released by Brandon-hall.com http://www.tmcnet.com/usubmit/2005/Jan/1109335.htm

Trier, M. et al.(2003): Lernen im sozialen Umfeld. Organisationen – Netzwerke – Intermediäre Kompetenzentwicklung beim Aufbau regionaler Infrastrukturen. QUEM-report. Schriften zur beruflichen Weiterbildung. Heft 77. Berlin, 2003. Website: http://www.abwf.de/content/main/publik/report/2003/Report-77.pdf 19.11.2005

Vygotsky, L. (1978): Mind in Society, Harvard University.

Vygotsky, L.S. (1962): Thought and Language. Cambridge, MA: MIT Press

Website:http://www.vox.no/upload/realkomp%20bibliotek/Validation%20non%20formal%20and%20inf%20-%20EJED-%20166%20-%20march%2004%20.pdf 20.11.2005

Whiteley, P. (2001): Quality Assurance: Its Centrality to the Administration of Caribbean Tertiary Level Institutions, The Caribbean Education Annual VI: 13-24.

Wikipedia, Extranet. Retrieved on 21 November 2005: http://en.wikipedia.org/wiki/Extranet

Wikipedia, Supply Chain. Retrieved on 21 November 2005: http://en.wikipedia.org/wiki/Supply_chain.

Willis, J. (2000): The maturing of constructivist instructional design: Some basic principles that can guide practice. Educational Technology, 40(1), 5-16.).

navreme knowledge development

navreme develops knowledge through evaluation, consultation, and research – at the right time.

We help build capacity in the state and non-governmental sectors. We connect local with international expertise to bring added value to transformation processes.

We form the hub of a dynamic, innovative and transnational expert network that covers the fields of education, policy making, and quality assurance across Europe.

We work in the EU and Central, Eastern and South-Eastern Europe, on Public Admini-stration Reform, Education, Communication and Human Resources, head-quartered in Vienna (AT), with network nodes in Prague (CZ), Skopje (MK) and Ankara (TR).

The name navreme means “at the right time in most Slavic languages”.

navreme‘s experts participate in flexible, on-spot or virtual collaboration in a range of own and commissioned projects:

- navreme‘s transnational research projects in education & training, regional devel-opment or peace, xenophobia and racism result in theoretical studies, analyses and policy reports. The network is committed to collaborative, applied and action re-search.
- navreme‘s international consulting activities include policy advice to, strategic programming for, scenario development with, and evaluations on behalf of EU institutions, governments and private firms. They imply the valorisation of explicit and tacit knowledge, and aim at capacity and institution building.
- navreme‘s interactive teaching and training shares findings from theory and practice with learners in learner-centred courses, seminars and workshops. This includes Virtual Learning Environments and e-learning.

www.navreme.net

The **series navreme | publications** collects experiences which stem from assignments, seminars, projects and reports of navreme and its partners across Europe. The content of these publications is practice-oriented, they are rather working tools than academic or theoretical aspirations. They may develop into fully-fledged books in the future, if so needed. In their present shape, they are meant to stimulate the creativity of colleagues to use and adapt them as appropriate. We hope these booklets will encourage many of you to upgrade, deepen, valorise and extend the value of projects, evaluations, and resulting learning – in order to do our jobs a little better in the future!

www.navreme.net/publications/publications.html

navreme | publications

1 Project Managerís Guide to Evaluation

2 Tools for Process Evaluation

3 Let Nets Work! [Festschrifterl - Mini Digest]

4 Culture Is Our Focus, Diversity Is Our Normality [INTER Guide]

5 Searching, Lurking, and the Zone of Proximal Development

navreme
knowledge development

navreme develops knowledge through evaluation, consultation, and research - at the right time. We form the hub of a dynamic, innovative and transnational expert network that covers the fields of education, policy making, and quality assurance across Europe

navreme KEG
knowledge development
Margaretenstrasse 99/8
AT 1050 Vienna
Austria
Tel/Fax: +43 1 945 6558
E-mail: wien@navreme.net
Web: www.navreme.net

navreme boheme s.r.o
Consulting and Training
u smaltovy 25/4
CZ 107 00 Praha
Czech Republic
Tel: +420 605 214 166
E-mail: praha@navreme.net
Web: www.navreme.net/boheme

ЦАЈТИГ дооел
European Consulting
Ulica Miřce Acev 74/4
MK 1000 Skopje
Macedonia
Tel: +359 70 479 417
E-mail: skopje@navreme.net
Web: www.navreme.net/cajtig