



Learning at work - A mean to creating company competitiveness.

Author:
Hanne Randle
APeL
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Introduction

When people discuss living in a future society it often means talking about the unknown and uncertainties. However, when living includes working life in the future it is postulated that people need to acquire more education and skills as life in the future society means living in a society in change (Brown et al 2001). Soft skills like willingness and ability to learn and working in teams are highly demanded in workplaces as the society is changing from the industrial society to the knowledge-based society. The expression lifelong learning is widely accepted and introduced from the European Commission as a tool for increasing individual employability and as a mean to increase company competitiveness. Living in the new society entails learning in order to be employable and flexible in the labour market (European Commission 2001). People around Europe will have to get used to the idea that their future work life will include participating in learning activities in order to be able to maintain employable skills (Jacobsson 2004). The task to supply learning initiatives should be a shared responsibility between the company owners, company managers, and the community's agencies. The European Commission simply states that;

“Companies have a duty to maintain the employability of their workers, while workers have a duty to participate fully in the training to maintain their own employability.” (CEC 1998:6)

In this paper, we shall discuss why EUExcert as a project can lead to a higher understanding of the needs to promote learning initiatives in the industry of explosives. We shall present two examples from the industry of explosives and one example from the steel industry in Sweden. The examples are used to illustrate different company needs to create favourable conditions to educate and train old and new employees to acquire company demanded skill. We can show in this report that when there is a successful match between company demanded skills and learning initiatives, it can lead to company development, increased company competitiveness and the creation of good conditions for sustainability.

Definition of the term competence

We shall begin this paper with defining the term competence. We shall use the trade union for steelworker's definition of competence as it is defined by the workers them selves. (Metall 2000:5) The trade union definition of the term competence is perhaps wider than Ellström's definition of competence, which is a person's ability to carry out a task and the ability to develop the task (Ellström 2002:1). The trade union definition emphasises a person's aspiration as part of their competence. Competence describes what a person *knows*, what a person is *able to do*, what a person *wants to do*, and what a person *dares to do*. *Knowing* is to possess theoretical knowledge. The *ability* to carry out duties is to possess previous experience and informal knowledge. A person *wanting* stands for ambition, attitude, and approach and for setting up goals. *Daring* stands for self-confidence and self-esteem.

In the next section, we shall describe the level of education in the population and discuss the need for competence enhancement among the people in the workforce.

The skills level in the workforce

The educational level of the working population in Norway, Sweden, Finland, and Denmark is slightly higher than in some countries in Europe; however, it is lower than found in the population in both USA and Canada. The level of education in the population could indicate that people have different needs to upgrade basic skills and therefore it is important to plan learning initiatives based on the prerequisite found in each organisation and country.

Countries, Educational level, 25-64 years, a total in all branches, figures in percentage

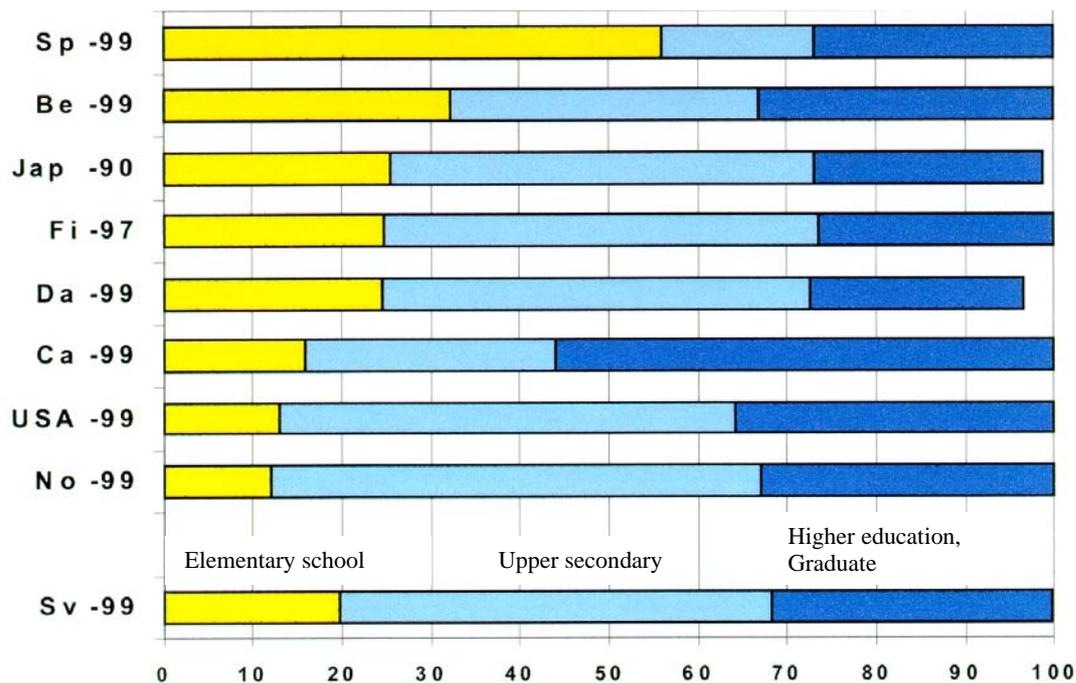


Figure 1 The educational level in thee population aged 25-64, all branches compared to some other countries¹.

A Swedish state report from 2001² estimates that in the private work sector 20 percent of all employees lack post elementary school education and that 50 percent of them have passed at least two years of upper secondary school education and the remaining group of 30 percent have reached an educational level equivalent to university studies. Employees that hold degrees equivalent to elementary school have gone down with eight percent between 1990 and 1999. The same study shows that (if compared to the qualification required in carrying out work related tasks in their job) 56 percent of the employees held jobs which were equivalent to their educational level and that 35 percent had lower educational level than needed in their job description. Finally, about nine percent of the employees have higher education than required in their jobs. Another study shows that among all the available jobs in Sweden in 1998 as many as 92 percent required special skills and during the period between 1992-1998, the available jobs that required university degrees went up from 20 percent to 36 percent. (Randle & Svensson 2002:1)

What is the situation like in the rest of Europe considering the level of education in their population? In addition, how have the different countries solved the issue of developing new methods and models for adult education and vocational training in line with the European Unions idea of lifelong learning? In the next section, we shall present one example from UK where they have created a National system for Vocational Qualifications as a mean to match skills demanded from the labour market.

UK and the agenda for skills development

The level of education varies a lot between the members in the enlarged European Union and the trade union organization TUC in UK have declared a need for the trade unions to introduce and promote learning agendas. An estimate is that 23 percent of people at work need assistance in developing life skills, literacy, numeracy and language, (Greenwood &

Stuart, 2002). A vocational route was developed through the attainment of industry defined occupational competences and the acquisition of National Vocational Qualifications (NVQs) to deal with the skills issue in UK, related to the lifelong learning agenda and the increasing demand of supplying skilled workers to the labour market. NVQs are awarded based on assessed on-the-job competence in five levels where each level indicates a degree of competence.

Level 1: knowledge in the performance of a variety of routine work- based tasks.

Level 2: knowledge in a range of work based duties in a variety of contexts.

Level 3: knowledge across a broad range and variety of tasks and contexts that is generally non-routine or even complex.

Level 4: knowledge in a broad range of technical or professional work that is performed in a wide scope of contexts involving a substantial element of individual autonomy.

Level 5: substantial personal autonomy and responsibility for others and the allocation of resources. (Greenwood & Stuart, 2002)

The NVQ system provides the system of education in UK a way to develop vocational training programmes according to specific and demanded skills levels. Several learning initiatives are run as on-the-job training or as traditional educational courses provided from community learning centres and colleges for further education. Trade unions run learning centres placed near workplaces where they supply NVQ and basic skills courses. The NVQ system provides employees with an alternative route to learning and career planning part from the traditional system for education.

Trial and Error

To work in the industry of explosives is not a child's game. To learn to do the job through copying how others do the job can turn out to be fatal. Working in the industry requires from the employees that they can reflect on their tasks and calculate for risks. Accidents with explosives have claimed the lives of more than a thousand people around the world since the turn of the millennium (Wallac 2004). The loss of lives can lead to a significant loss of skills and production. Human failure has caused many accidents, which often has its roots in the lack of skills and training. As the terms of manufacturing are related to hazard, it is linked to jurisdiction and legislation. The organisation NIEF makes up the supervisory and inspection board. They authorize explosives and issues licenses to manufacturing companies.

In many other manufacturing companies in other sectors of the economy like the steel sector, the way to learn to do the job goes through years of practice and trial and error. Employees learn the ropes from their colleagues and by experience (Boud 1999). Mistakes can sometimes result in personal injuries and in increased manufacturing costs as the manufactured items have to be scrapped, however they do not very often result in fatalities. To learn the hard way is very often the way to learn in life but it is not the right method for learning in the industry for explosives.

The urgent need to upskill employees

There exists a mismatch situation on the labour market with high levels of unemployment and skills shortage at the same time (Faurbaek 2004). The ongoing restructuring of industries is one cause to unemployment as many companies have downsized and displaced workers. Many young and well-educated employees are forced to leave companies because of labour market regulations. People cannot find work on the labour market as they lack sufficient qualifications to meet the demanded requirement in basic education or entry-level skills. Many older and skilled workers are about to leave the industries to retire. Many companies

experience a situation of today when they cannot find people to recruit with sufficient skills to qualify for entry-level requirements. (Europeiska kommissionen) Younger people are no longer seeking career opportunities in these sectors of the industry. During periods of restructuring, few newcomers are allowed to enter the businesses as company manager's focus too much on short-term results.

This situation is getting an acute dilemma for many companies as they are experiencing it a difficult task to replace the older generation of workers. These older workers have devoted their entire life to the company and the industry and they are regarded as highly skilled and key employees. Many of these tacit skills are not easy to access. Many of the employees for example in the steel industry have in order to learn how to become a skilled steel worker participated in training programmes at the workplace, where they have learned the jobs from their peers. This is a problem in the downsized companies of today as there is no slack in the manufacturing process to allow for people to work alongside each other in order to learn a job. In the end, this trend to focus too much on profits could lead to a skills shortage and a lack of knowledge of the trade, as skilled older workers leave the company and there are no newcomers taking their places (Randle 2004).

Other examples

A recent project in Spain tested how they could by the help of government funding upskill young steel workers. They started a mentor programme where the older generation of workers before they went into retirement had to teach a young worker to do the job. The funding from the government allowed for the company to have two people working alongside each other in the aim of transferring tacit skills from one person to another. When the newcomer got more skilled in the doing the job then the older worker could cut down on his working hours. This kind of learning process provides a contextual and social network where the newcomer can learn and understand the logics of knowing how to do the job (Stymme 2001).

How can learning, education, and training be demand-led?

How can the company managers solve the problem of finding skilled people to employ, just in time when they need to recruit? Svensson & Åberg (2001) argues that a way to deal with this situation is to introduce learning at workplaces by providing training and education which people demand and to provide it on their own terms. The training activities should be based on the specific needs found in the workplace and build on the employee's earlier experiences and skills. Learning should take place and be planned as an integral part of work, where people participating in training feel a strong connection between training and their work tasks. It is also important to make sure that people feel that they can use their newly acquired skills in their work. Reflection³ should be part of learning to develop skills that can be used in both work life and in everyday life.

However, the system of education is not very flexible when it comes to supply vocational education and training matched to company requirement (Svensson 2004). Education suppliers deliver formal packages suited for larger homogenous groups, which becomes a problem for company managers, as they cannot afford to invest in huge vocational programmes. Their demand is to train and recruit only a few people at the time. Another problem is that organisations and individuals seldom demand these ready-made packages; instead, they demand customised and flexible solutions adapted to each situation and company. This matching problem can be described as a gap between the demands set from the companies and the supply of learning services provided from education institutions. The education providers are not flexible enough in their variation of programmes and courses

especially when it comes to time and place. They cannot provide programmes that are easily adapted to company or individual requirements. In addition, there is often a mismatch between the contents in courses and the required skills necessary when learning to carry out a task.

Education providers who are successful in supplying demand-led vocational and educational programmes have the knowledge to match make between company demands with their supply of learning activities. They have the knowledge and skills to make an analysis of the employer's demands for competence. They organise demanded training and education into activities that are both flexible and accessible. They provide courses, which are flexible in both length and content. Individually adjusted study plans reflect previous knowledge and skills, which are assessed through a system for accreditation of previous education and work/life experience. Courses are flexible enough to provide an opportunity to study part-time, at work, at home or at a local learning centre. They create support structures for distance studies when based on computer technology. Trained facilitators make up support structures for individuals. Finally, they are successful when integrating individual learning activities as part of an overall organisational change process. They make sure that company managers have a plan for each employee to use their newly acquired skills in their work. (Randle 2002)

In the next section, we shall present two examples of demand-led learning from the industry of explosives.

Blästerugnen a model tried at Vingåkersverken AB.

The learning centre started as an initiative from the company Nammo Liab in Vingåker. It is a company in the industry of explosives with 120 employees. The objectives with the project were to enhance company-required skills among both their employees and unemployed people from the near community. The company is experiencing a potential skills shortage as a substantial amount of employees are retiring in the near future. People with required skills are not to be found in the local jobcentre or elsewhere in the labour market. Historically the employees have trained newcomers and each other by using informal methods essentially through peer learning. Older workers transfer tacit knowledge to newcomers by relying on-the-job training and by providing learning by experience. There is a strong tradition in the industry, due to safety reasons, to copy existing work methods and technology. (APeL Rapport 1, 2001, Randle 2002:1, Randle 2002:2)

The management on the plant made an assessment that they had to find ways to train workers to maintain necessary skills levels needed on the plant. At this moment, there were no existing courses on the market for this type of education programmes so consequently they had to invent a new wheel for training. A community-learning centre⁴ that had previous experience in supplying demand-led learning activities to the industry came up with a solution. They convinced the management at the plant to invest in this project and to set up a learning centre at the plant. They started a 20-week course in on-the-job training and education for both their employees and unemployed. About 15 people were offered this opportunity to take part in the course. The management agreed to let the workers split their workdays, half day for study and half day for work. A specific production line was set up for the participants in this way the unemployed people could get on-the-job training and experience by initially copying the work methods of the "older" and more experienced workers. The group was glued together as a team as it was important to have a well functioning and well-motivated group in order to make this project successful.

Company demands and individual requirements and aspirations decided the contents in the vocational education and training programme. The course included some compulsory parts; subjects like knowledge of explosives step 1 and step 2. Each person could study the

compulsory courses in his or her own pace. The trainees spent half day using distance-learning techniques at the learning centre, placed a few minute walk from the shop floor. The rest of the day, the group spent practicing their work. The employees who took part in the training programme had to apply for a training position.

Qualified Vocational Training Programme QVT

About three years after the pilot training programme at Vingåkersverken AB the same community-learning centre and agencies representing the industry started a programme for qualified vocational training at six companies in the industry of explosives⁵. The programme was developed and based on the experiences learned from the pilot programme. This QVT-programme was aimed for both unemployed people and employees from each participating workplace. Each student had their own individually set up study plan and training programme, which was based on earlier education, experiences, and skills. As in the pilot programme, the study time was divided between on-the-job training together with colleagues and studying in the learning centre using distance-learning techniques.

The QVT-programme was run during a 40-week course. The programme was developed together with KCEM⁶, Masugnen (a community learning centre), and managers representing companies in the industry of explosives, the trade union, the University in Örebro and other agencies in the community.

The QVT programme included some compulsory parts; subjects like knowledge of explosives step 1 and step 2 and other specific skills required when working with explosives. The students could also learn subjects such as working in teams, to participate and develop work processes and develop quality standards. The students practiced on-the-job training for 26 weeks. (Jakobsson 2004)

The QVT programme was longer in duration and the students could get more time to learn how to do the job. The students were separated during the on-the-job training as they were stationed at one particular company or their home company during the periods of training. However, the learning centre organised for joint learning sessions where all participants could get together as a group. They also increased the number of subjects to study compared to the pilot course and they were more focused on work related subjects. In the pilot programme, the students could study basic/core skills if they desired to do so. The same opportunity was not provided in the QVT programme.

What can be learned from these two examples? We shall describe the benefits of demand-led learning programmes in the next section.

Demand-led learning programmes

In both these examples, the focus on demands was significant when setting up the projects. The courses had a mix of both core studies and other subjects that had relevance to the knowledge and skills required in each specific firm. After the courses, the students received grades and certificates in the subjects they had studied. Learning activities were organised in flexible ways by using distance-learning methods and study materials were especially written to suit distance studies. Each person had individual study plans with a mix of subjects and courses to study, adjusted to previous experience and knowledge.

The learning centre provided the infrastructure for distance learning techniques when broadcasting live sessions by web cameras directly from the learning centre or from other plants. The students needed basic computer skills as the method for learning was based on e-learning and the student communicated with instructors and colleagues through e-mail, fax or

phone they were not present at the learning centre. They were successful when linking training to work and the trainees experienced that they could use their acquired skills in their work. Learning was also in some parts integrated with organisational development as some participants have taken part in developing work routines and organisational changes at their workplaces. Nevertheless, how can the benefits from investing in learning activities be calculated and made visible to company managers and owners? In the next section, we shall describe a company in the steel industry that has been successful in combining investments in learning at work with increased company competitiveness.

The need for demand-led learning, examples from the steel industry

The workers in the steel industry exist in the industry with the toughest business condition in the economy. The industry is highly dependent on market prices and competition from other steel factories around the world and this situation affects the steelworkers every day life as the conditions at their workplace can change quickly. The trade union estimates that in the next decade about 80 percent of the technology of today will be changed. At the same time, 80 percent of the available labour craft will have a vocational education⁷ that is older than ten years. New skills are in demand in the steel industry. Flexibility, initiative, and ability to work in teams are social skills that are stressed (Randle & Svensson 2002:2).

At this company, which is a mechanical workshop, the customer has always been in focus and the workers acknowledge customer service as the key factor for survival. If customers do not demand the products, then the company will not survive. To be able to manufacture products demanded from the customers, it requires competent workers and a flexible workshop. The company has to invest in acquiring new knowledge through informal and formal learning. The introduction of new techniques and new equipment is valued as essential if the company wants to sustain the capacity to provide the products demanded from the market. The workers are in that sense used to work in a society in constant change and they understand the need to take charge in developing their own skills, knowledge, and tasks (Randle 2004).

The employees understand the problem with skills shortage and they understand the relation between maintaining high skills in order to be able to manufacture customer demanded products. The employees are actively taking part in developing the workplace. The focus is on developing strategies for increased competitiveness, through their own contribution towards the dynamic balance between product and process innovations. The company is recognising and utilising the employees' skills, learning abilities and creativity. They view the regeneration of new knowledge as vital for the company.

Tacit skills in a mechanical workshop

The working culture at this company is oriented around mechanical engineering and learning to use machinery. The workflow is labour intensive and each step is pure craftsmanship. Work is organised around flexible workers who have the skills to manage several tasks and operations and who can handle work tasks varying from manual work to managerial tasks. The manufacturing process includes people operating machinery, some computer programmed, or using different kinds of tools. The workflow changes with each different piece they manufacture. At times, they have to rearrange the entire workshop to fit in large pieces. The work teams plan and execute the order of the workflow together as well as set the time limit for each operation even when they introduce new products in the manufacturing line. They also plan changes in the workflow, develop the routines of work, plan for staffing of teams and plan for the employees learning needs and fit training in together with the workflow. (Randle 2004) When the plan to manufacture a customised or new item, the

process starts afresh as they want to avoid old habits and routines in manufacturing. The employees are encouraged to come up with new solutions to manufacturing even during the manufacturing process. This means that they can change the workflow even after a line is set up.

Learning at work through experience and knowledge

They can introduce technical changes in the company as long as the employees fulfil basic requirements, which mean that people can learn new skills and use new equipment and they have an overall understanding of the manufactured products. The work teams have accepted to introduce learning in different forms, as they view it necessary to require new skills related to the capacity to operate machinery and to develop work tasks. The ability to reflect on why things are done in certain ways is a skill the employees have learnt while working with new items in the manufacturing line and from bringing home experiences from working at customer sites. The employees reach an understanding of the necessity to be able to solve problems based on particular circumstances when they can use previous experience combined with new knowledge in their actions. Ellström (2002:1) illustrates this kind of learning as based on the logics of development where experimental learning is part of developing new knowledge.

They can reflect on their own practice when working on customer sites. Learning is understood as the same as acquiring new skills in order to be able to become a more skilled and flexible worker. Work is organised around the integrated production system where the customer and customer needs are in the centre of activities (Brulin & Nilsson 1995). They define the skill requirement from the perspective of company needs assessed in comparison to individual workers skills. The employees train each other to solve problems and to think afresh and therefore they can take part in developmental work aimed for organisational changes. The objectives of learning at this company are to become a more skilled worker but also to learn how to develop work in itself and to solve problems based on new circumstances. Learning is developmentally oriented as the employees learn how to try out new methods in new situations, where the tasks and results are not known in advance (Ellström 2002:2).

Both the company managers and the trade union collaborate with the agencies in the community to develop learning initiatives, and they view learning and the development of the workplace and work tasks as important tasks to work with. The employees are expected to carry out new work tasks and to change them and they must be able to rotate between functions and take on several work tasks, which requires more skills. The employees also handle plenty of information from the outside world. Learning at work is organised so the employees can learn from previous experiences and subsequently change their work routines, which emphasises the importance of organising activities as a combination of informal learning where employees can learn from each other and formal education and vocational training.

Why has this plant been successful in finding out functional methods for learning? We can explain the success as a combination of several factors.

- There is common understanding of the concept of working in teams at the plant, which gives a meaning to the employees.
- They have managed to engage each workers interest in doing the job well, which entails that the employees can see the benefits from learning as a mean to be able to do the job well.

- All employees at the plant share the experience of participating in developing company competitiveness, as they understand the need to be able to customise the process of manufacturing.
- The feeling of a shared responsibility to maintain skills is probably a reason for why learning is part of every day work at this particular plant.
- Learning makes sense to the employees and it makes sense to the managers, as they understand the basic mechanism of living in a society in constant change.
- There is no fundamental rivalry between the company managers and the employees.
- The employees have a basic understanding of skill requirements related to demands from their customers.
- The workers are proud of their vocation.
- They have been successful in developing functional relations with the community's agencies who can provide an infrastructure for learning.
- They have been successful in knowing how to communicate learning demands.

The effects of investing in learning related to sustainability

The conditions at the steel company are likely to lead to a sustainable work system, as the company's good seem to harmonise with the idea to create conditions where human resources are regenerated and allowed to grow (Docherty et al 2002). The company's management and the employees manage change processes together in co-operation and the trade union is regarded as a resourceful and competent partner from the management as there is a legitimate and established relationship between the trade union and the company management. Working industrial relations is essential when the employees need to influence management in order to view matters in a longer perspective as a mean to reach sustainable conditions instead of putting too much focus on short-term economic goals (Randle & Svensson 2004). As they have change competence and an overall understanding of matters related to business they have the power to influence the consequences and conditions of the rapidly changing environment and they take a joint responsibility in developing the prerequisites for the sustainable workplace. This means they are heading in a positive direction and can sustain market competitiveness.

EUExcert, KCEM and learning

EUExcert has the ambition to provide a comprehensive framework for developing competency programmes for the industry. This will include several steps such as; training programmes, education programmes based on a particular curriculum of subjects, topics, and knowledge necessary to generate and develop the competencies demanded from the industry. Based on this it is necessary to develop training and education contents, which will be general enough to be applicable to the different countries in Europe but specific enough to provide a general knowledge for working in the industry for explosives. The idea is to make the training contents available in modules to reach a high degree of flexibility. It is necessary to adapt the contents to suit employees at all levels in the industry but particularly to each individual's educational background. (Nilsson & Wallin 2004)

Several issues, which can function as barriers for long-term planning of learning initiatives and sustainability, could be;

- Managers who lack motives for organising activities relating to competence enhancement issues.
- Reluctant learners.
- Slimmed and downsized organisations only provide for small chances to spare the employees to participate in learning during working hours.
- Static work organisations where general knowledge and skills are not required.

- Low levels of autonomy in work teams and employees.
- Middle management not in favour of developing work contents.
- A lack of experience in organising learning activities in the organisation.

The present task is to develop the grounds where the demands for competency development can be discussed between the branch organisations in Europe, the company managers, human resource personnel, trade unions and the communities' agencies when can provide an infrastructure for learning at the workplaces. The basis for such discussion should be the dilemma of the ongoing restructuring of the business, which requires slimmed organisations, the introduction of new technology and at the same time skills enhancement (Bengtsson & Berggren 2001). The risk of skills shortage in the industry of explosives is also important as new technology is used to handle material manufactured in the old days, which requires the skills and knowledge from the past.

Other important factors basing the discussion should be to highlight investments in learning compared to corporate competitiveness and sustainability. EUExcert can carry the role of a speaking partner to start discussion about the consequences of focusing too much on short-term profits in relation to sustainable development. They could have the ambition to influence the system of regulation in the industry for explosives in the European Union. One reason to influence regulation could be to perhaps limit the entrance of low cost manufacturing enterprises on the market, as this could jeopardize the development of safe workplaces and the continuous development of low-risk manufacturing conditions.

The EUExcert organisation could also develop tools for long-term planning to be used for assessing competency and skills needs adapted for future demands from the industry. They can use resources from different competence and research centres when it comes to the development of contents and learning methods.

Below is a chart that describes the combination of factors, which should influence the planning of learning initiatives (Table 1). It is our opinion that the manufacturing process or the workflow in an organisation should make the basis for learning requirements as it defines *how* work is carried out. The process defines *what* contents of work is found in the organisation and the learning requirements should be matched to the actual and potential *contents of work*. The *work organisation* also defines the learning culture or *system for learning* which is exists in every organisation. It is important to match the learning activities to the learning system, for example support informal, peer learning with theoretical, formal contents, perhaps in on-the-job learning centres. Both actual and potential needs found in the job tasks should guide the choice of contents in all *learning activities* and be adapted for individual prerequisites and desires. Finally, we cannot emphasise enough that individual participation in learning activities should always result in an increased organisational capacity for the development of work tasks and work contents as well as result in an increased individual capacity develop within their work.

<u>Societal level</u>	<u>What</u>	<u>How</u>
Regulations		
Organisational level	Contents of work	Work organisation
Corporate finances	Specific tasks	Systems of manufacturing
Safety regulations	Multi skilled	Line production
Work environmental regulations	Flexible worker	Team work
	Customer relations	Autonomous workers / teams
	Administrative skills	Work rotation
	Quality assurance	Work enrichment
	Responsibilities	Learning culture
	Social skills	
	Overall understanding	
	Contents in learning activities	Organisation of learning activities
Individual level	Specific knowledge	e-learning
	Work related knowledge	Learning organisation
	General knowledge	Learning part of work
	Social skills	Learning for development
	Team skills	Adjusted to company change
	Autonomous worker	Study circles
	Change competence	Peer learning
		Problem based learning
		Experience based learning
		Team learning

Table 1. The interrelationship between learning and organisational prerequisites

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¹ Ingrid Bergström-Levander , Utbildningsnivån per näringsgren. Prognosinstitutet, Statistiska centralbyrån 2000

² The Swedish state institute for economic growth studies

³ For more details about tacit knowledge, informal, non-formal, formal training and education connected to a learning situation, see Svensson L and Åberg C, 2000.

⁴ Masugnen i Lindesberg

⁵ Masugen i Lindesberg KY utbildning – för tekniker inom Explosiva och Brandfarliga ämnen

⁶ Nationellt Kompetens Centrum för Energetiska Material (The national Competence Centre for Energetic Materials)

⁷ The trade union has chosen to use the term vocational education instead of vocational training.